



PART I

- Introduction to Research
- How to prepare your
 - Title & Abstract
 - Aims & Objectives
 - Problem Statement
 - Research Contribution
- Writing your Literature Review
- Acknowledging your Sources
 - Plagiarism
 - Paraphrasing
 - Quoting
 - Citing
 - Referencing



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WHAT IS RESEARCH?

Research is “a procedure by which we attempt to systematically find the answer to a question or the resolution of a problem, with the support of demonstrable fact.”

(adapted from Leedy, 1989)

Research is “a systematic investigation into the study of materials, sources, etc. in order to establish facts and reach new conclusions”

(Oxford Encyclopedic English Dictionary)

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THE RESEARCH CYCLE



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RESEARCH QUESTIONS

The framework of any research project relies on the answers to four important questions:

- **What** are you going to do? → Title, Aims and Objectives
- **Why** are you going to do it? → Problem Statement and Contribution of Study
- **How** are you going to do it? → Research Methods or Methodology
- **When** are you going to do it? → Project Planning



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THE RESEARCH PROBLEM

- One of the first tasks on the way to deciding on the detailed topic of research is to find:
 - (1) A question, or
 - (2) An unresolved controversy, or
 - (3) A gap in knowledge, or
 - (4) An unanswered need,

*This search requires
an awareness of
current issues in the
chosen subject and an
inquisitive mind.*



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PREPARING YOUR RESEARCH TITLE

- The **title of your research** should explain in sufficient detail what you are doing so that potential readers can decide if this is relevant to their interests.
- The title for your research should be a clear and precise description of the topic. A title should specify sufficient detail so that places, organisations, subjects are readily identifiable.
- A title should use appropriate phrases to specify the nature of the investigation such as “*differences between*”, “*relationship of*”, and “*quantify*”.

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PREPARING YOUR RESEARCH TITLE

A **good title** should:

- Have the most important words appear toward the beginning of the title.
- Not use of ambiguous or confusing words.
- Include key words that will help researchers in the future find your work.



“*A study on odour from leachate*”



“*A study investigating odour from landfill leachate*”



“*The relationship between odour and the presence of sulphurous hydrocarbons in landfill leachate sampled at Kundang Landfill, Rawang*”

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PREPARING YOUR ABSTRACT

- The **abstract** is presented at the beginning of the proposal or final report. The reader will most likely refer to this section first in order to get an overall idea of your research and decide if it is of interest to the reader, or not.
- The abstract is a summary of the whole proposal/final report. It presents all the major elements of your work in a highly condensed form.
- The structure of the abstract should represent the structure of the entire proposal/final report, and should contain all its major elements, i.e. introduction, methodology, results (or expected results), conclusion.

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PREPARING YOUR ABSTRACT

- Keep your abstract short and simple (in one page, preferably 150 to 250 words).
- A good abstract has the following qualities:
 1. Uses one or more well developed paragraphs: these are unified, coherent, concise.
 2. Uses an introduction-body-conclusion structure.
 3. Follows the chronology of the proposal/final report.
 4. Provides logical connections between the information included.
 5. Adds no new information, but simply summarises.
 6. Often uses passive verbs to downplay the author and emphasize information.
e.g. *The research was conducted for the purpose of ...*
Observations were made during ...

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PREPARING YOUR ABSTRACT

- For **proposals**, however, use the **future tense** since you have not conducted the work nor obtained any results yet.

e.g. *The collection of data will involve
A relationship will be developed between*



Remember, although the abstract comes first, it should be prepared last!

Avoid the use of personal experiences and opinions.

Avoid using references or quotes.

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PREPARING YOUR AIMS AND OBJECTIVES

Aims:

- Are broad statements of desired outcomes.
- Emphasize what is to be accomplished (not how it is to be accomplished)
- Address the long-term project outcomes, *i.e.* they should reflect the aspirations and expectations of the research topic.

Once aims have been established, the next task is to formulate the objectives. Generally, a project should have no more than two or three aims statements, while it may include a number of objectives consistent with them.

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PREPARING YOUR AIMS AND OBJECTIVES

Objectives:

- Are the steps you are going to take to answer your research questions or a specific list of tasks needed to accomplish the goals of the project.
- Emphasize how aims are to be accomplished.
- Must be highly focused and feasible.
- Address the more immediate project outcomes.
- Make accurate use of concepts.
- Must be sensible and precisely described.
- Should read as an 'individual' statement to convey your intentions.

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PREPARING YOUR AIMS AND OBJECTIVES

A good objective communicates your intent well and leaves little room for interpretation. Thus **avoid** using the following verbs when writing your objectives:

 to learn ...	 "To learn the effects of aggregate gradation and fineness on the properties of concrete"
 to conduct ...	
 to understand ...	
 to know ...	 "To analyse the effects of aggregate gradation and fineness on the properties of concrete"
 to collect ...	
 to determine ...	

It is encouraged that you use verbs suggested in Bloom's Taxonomy of Cognitive Levels. 

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PREPARING YOUR PROBLEM STATEMENT

- A **problem statement** is a description of an issue that needs to be researched to see whether a solution can be found.
- Writing a problem statement should help you clearly identify the purpose of the project you will propose.
- It also serves as the basis for the introductory section of your final report, directing your reader's attention quickly to the issues that your research project will address.
- A problem statement should be **short and concise**. One page is more than enough for a good statement of problem.

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PREPARING YOUR PROBLEM STATEMENT

- A persuasive problem statement consists of three parts:
 1. the ideal,
 2. the reality, and
 3. the consequences.
- *The ideal*: Explains how things should be.
- *The reality*: Explains how the current situation falls short of the goal or ideal.
- *The consequences*: Identifies the way you propose to improve the current situation and move it closer to the goal or ideal.

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PREPARING YOUR PROBLEM STATEMENT

Example of a problem statement:

The ideal

In order to accomplish their missions, public universities in Kenya need motivated workforces.

The reality

There are however frequent and severe disciplinary actions, absenteeism as well as various forms of unrests in Kenyan public universities which affect the accomplishment of the set missions. Our preliminary investigation reveals that both non-management and management staff are not adequately motivated.

The consequences

Without effective motivational packages and procedures the said vices are likely to continue and retard the achievement of the universities' missions. Need arises to examine the public universities' motivation systems and procedures hence this proposed research.

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PREPARING YOUR RESEARCH CONTRIBUTION

Explaining how your research is new and why it matters may be a difficult task. The following are some tips writers use to indicate their research contribution:

1. Demonstrate in a sentence how your research matters to the general public.
2. Review and summarise previously published research literature.
3. Identify a "gap" in the previous research (i.e. a problem that has not been resolved, or a new application that has not been considered).
4. Show that there is something missing (or unfulfilled) in the current state of research and that there is a need for this gap to be filled.
5. Present your own research as "filler" for this gap.

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LITERATURE REVIEW

A **literature review** is a description of the literature relevant to a particular field or topic.



A literature review gives an overview of the field of inquiry:

What has already been said on the topic?

Who the writers are?

What the prevailing theories and hypotheses are?

What questions are being asked?

What methodologies and methods are appropriate and useful?

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LITERATURE REVIEW

What sources are considered “valid” literature?

Everything relevant to your research topic that has been written and published, such as:

Journal articles

Conference proceedings

Books

Historical records

Government records

Newspaper articles

Theses

Dissertations

Project reports

Technical notes/papers

Standards / Specifications

Manuals / Guidelines

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LITERATURE REVIEW

What sources are considered NOT VALID literature?



Wikipedia

Blogs

Online
Forums

Lecture
Notes

Important!

Do not just summarise the research findings that others have reported. You must also evaluate and comment about each study's worth and validity.

You should conclude the review with a statement of your hypothesis, or a focused research question.

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WRITING YOUR LITERATURE REVIEW

Your review should be made up of three parts:

- (1) Introduction
- (2) Body
- (3) Conclusion

The **introduction** should include:

- The nature of the topic under discussion (the topic of your thesis)
- The parameters of the topic (what does it include and exclude)?
- The basis for your selection of the literature

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WRITING YOUR LITERATURE REVIEW

The **body** should include, among others:

- Historical background, including classic texts
- Current mainstream versus alternative theoretical or ideological viewpoints
- Possible approaches to the subject (empirical, philosophical, historical, etc)
- Definitions in use
- Current/past research studies
- Current/past discoveries about the topic
- Principal questions that are being asked
- General conclusions that are being drawn
- Methodologies and methods in use

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WRITING YOUR LITERATURE REVIEW

The **conclusion** should include:

- A summary of major agreements and disagreements in the literature
- A summary of general conclusions
- A summary of where your thesis stands in the literature (in the future)



Writing a literature review is the hardest part of report writing but like it or not, it is one of the most important sections of your report! The good thing is that in the end, you will become an expert in your research topic!

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ACKNOWLEDGING SOURCES

Whenever you have quoted another author's theory, opinion, idea, example, conclusion, or findings, you must indicate who you took it from, and where the original can be found.

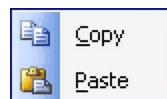
In other words, you must acknowledge and cite your sources.

If you have used another author's work and you do not acknowledge the author, then you may be accused of **plagiarism**.

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PLAGIARISM

Plagiarism is the act of using another person's work as if they are your own. It is a very serious breach of academic etiquette.



You have committed plagiarism if you have:

- (1) Copied more than 4-6 consecutive words.
- (2) Copied ideas originally thought of by others.
- (3) Copied research methods described by others, especially if it is not common knowledge.
- (4) Reported data, figures and tables belonging to other researchers as your own.

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PLAGIARISM

You can **avoid plagiarism** if you **provide proper acknowledgement** when using:

- (1) Another person's ideas, opinions or theories.
- (2) Any information that is not common knowledge.
- (3) Quotations of another person's spoken or written words.
- (4) Paraphrases of another person's spoken or written words.

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PARAPHRASING

How to paraphrase?

Paraphrasing is a restatement of the meaning of a text or passage using other (your own) words.

To practice good paraphrasing, you should:

- (1) Clearly understand the text.
- (2) Change most of the words in the original text.
- (3) Change the word order and structure of the original text.
- (4) Include an accurate reference.

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PARAPHRASING

Example:

Original Text

from White & Richards (2007)

Scientists and policy-makers generally agree that the likelihood of flooding in the UK will increase as a result of climate change. It is also accepted that sensible land use and development planning plays an important role in the management of flood risk, while allowing necessary development to continue (Evans et al., 2004; cited in Thorne et al. 2007).



Paraphrase #1

Scientists and policy-makers agree that climate change means that the likelihood of flooding in the UK will increase. It is also agreed that the role of sensible land use and development planning are important in the management of flood risk, also allowing necessary development to continue (White & Richards, 2007).

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PARAPHRASING

Example:

Original Text

from White & Richards (2007)

Scientists and policy-makers generally agree that the likelihood of flooding in the UK will increase as a result of climate change. It is also accepted that sensible land use and development planning plays an important role in the management of flood risk, while allowing necessary development to continue (Evans et al., 2004; cited in Thorne et al. 2007).



Paraphrase #2

There is a general consensus between researchers and government planners that climate change will lead to a greater frequency of flooding in the UK. Given this context, it is clear that sustainable planning and land use policies are vital. However, this does not mean that development will cease, on the contrary, essential development must continue (Evans et al. 2004; Thorne et al., 2007; cited in White & Richards, 2007)

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QUOTING

Using Quotations

A quotation is an exact reproduction of spoken or written words. Direct quotes can provide strong evidence, act as an authoritative voice, or support a writer's statements.

e.g. Bell and Bell (1999) point out in their study of Australian-American cultural relations: “culture is never simply imposed ‘from above’ but is negotiated through existing patterns and traditions.”

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QUOTING

How to quote?

Make sure that you have a good reason to use a direct quotation. Quoting should be done sparingly and should support your own work, not replace it.

For example, make a point in your own words, then support it with an authoritative quote.

Every direct quotation should appear between quotation marks (“ ”).

Longer quotations (more than 3 lines of text) should start on a new line, be indented and in italics.

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QUOTING

Example:

Your own words

Support by quotation

Critical debates about the value of popular culture often raise the spectres of Americanisation and cultural imperialism, particular issues for a ‘provincial’ culture. However, as Bell and Bell (1993) point out in their study of Australian-American cultural relations: “culture is never simply imposed ‘from above’ but is negotiated through existing patterns and traditions.”

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CITING

Citing references in text:

Author (Year) found that

It was found that (Author, Year).

Remember, you must only mention the **author's surname** when citing in text and the year the source was published.

e.g. Linda Johnson (2001)
→ (Johnson, 2001) or Johnson (2001)

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CITING

Example:

According to Mohamed (2005), a large proportion of scheduling problems in the various sectors, such as economic and engineering, can be classified with a class of problems known as constrained optimisation.

or

A large proportion of scheduling problems in the various sectors, such as economic and engineering, can be classified with a class of problems known as constrained optimisation (Mohamed, 2005).

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CITING

If there are **two** authors, e.g. Mohd Ali Abdullah and Tan Beng Keat (2008)

→(Abdullah & Tan, 2008) or Abdullah & Tan (2008)

If there are **three or more** authors, e.g. John Michael Smith, Paul Lee, Ranjit Singh & Syed Naser Al-Attas (2011)

→ (Smith et al., 2011)



Main author

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REFERENCING

Writing the References list:

The References list must be in **alphabetical order**.

If you have referred to two or more articles by the same author, then arrange according to the year published (earliest article first).

e.g.

Shinar, D. (2001)

Shinar, D. (2007)

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REFERENCING

If you have referred to two or more articles by the same author from the same year, then use lowercase letters (a, b, c) to differentiate them and arrange according to the date published (earliest article first).

e.g.

Matsufuji , Y. (2003a)

Matsufuji, Y. (2003b)

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REFERENCING

Books:

Author (Year). *Title of Book*. Edition. Location:
Publisher.

e.g.

Walliman, N. (2005). *Your Research Project: A Step-by-step Guide for First Time Researcher*. 2nd ed.
London: Sage Publications.

 Indent after first line

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REFERENCING

Journals:

Author (Year). Title of Article. *Name of Journal*,
Volume No. (Issue No.), page numbers.

e.g.

Mikac, N. & Branica, M. (1994). Complexation of
Trialkyllead with Diethyldithiocarbonate.
Electroanalysis, 6(2), pp. 37 – 43.

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REFERENCING

Proceedings:

Author (Year). Title. *Proceeding*. Location: Publisher.
Page numbers.

e.g.

Alias, M. (2006). The Effects of Teacher Generated
Concept Maps on the Learning of Secondary
School Physics. *Proc. of the Second Int. Conf. on
Concept Mapping*. San Jose: Universidad de Costa
Rica. pp. 550-557.

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REFERENCING

Corporate Documents:

Name of corporate body (Year). *Title of document*.
Location: Publisher.

e.g.

Austroads (2008). *Guide to Traffic Management: Part
8: Local Area Traffic Management*. Sydney:
Austroads.

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REFERENCING

Standards:

Name of institution (Year). *Name of standard*.
Location: Standard number.

e.g.

British Standards Institution (1987). *Tongued and Grooved Software Flooring*. London: BS 1297.

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REFERENCING

Theses:

Author (Year). *Title*. Name of institution: Level of thesis.

e.g.

Mohamed, B. (2008). *Design of Pavement on Soft Soil*. Universiti Tun Hussein Onn Malaysia: Master's Project Report.

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REFERENCING

Newspapers:

Author (Date). Title of article. *Name of newspaper*.
Page numbers.

e.g.

Latiff, A. B. A. (2001, Februari 14). Hatinya telah dimiliki. *Utusan Mingguan*. p. 12.

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REFERENCING

Articles published on the internet:

Author (Date). Title of article. *Name of website*. Date retrieved, from URL.

e.g.

Cain, K. (2012, June 29). The Negative Effects of Facebook on Communication. *Social Media Today RSS*. Retrieved January 3, 2013, from <http://socialmediatoday.com>.

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PART II

- Designing your Research
- Research Methodology
 - Data Collection
 - Data Analysis
- Presenting your Findings
- Concluding your Report
- Writing your Proposal (FYP 1)
- Writing your Final Report (FYP 2)
- Writing your Technical Paper (FYP 2)
- Tips for Presenting

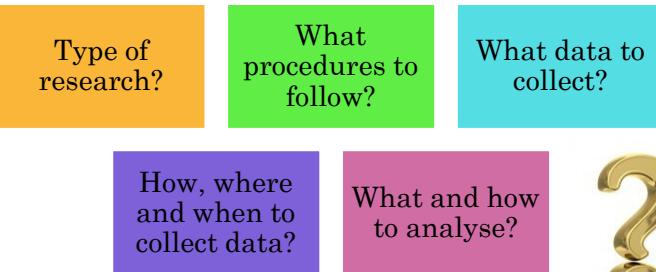


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RESEARCH DESIGN

The **research design** provides the overall structure for the procedures the researcher follows, the data the researcher collects, and the data analyses the researcher conducts.

In simple terms, **research design = planning**



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RESEARCH METHODOLOGY

Research methodology is the **approach** and **techniques** a researcher uses to collect and analyse data.

There are two primary approaches to research:

Qualitative research involves looking at characteristics, or *qualities*, that cannot easily be reduced to numerical values. It aims to examine the distinctiveness and complexities of a particular phenomenon.

Quantitative research involves looking at amounts, or *quantities*, of one or more variables of interest. It tries to measure variables in some way.

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DATA COLLECTION: TYPES OF DATA

Data collection is an important aspect of any type of research study. Inaccurate data collection can impact the results of a study and ultimately lead to invalid results.

Types of data:

Quantitative data – measured on a numerical scale, e.g. rate of flow (milliliters per second), speed (kilometers per hour), area (square meters), etc.

Qualitative data – cannot be measured but can be observed, e.g. marital status (single, married or divorced), compliance to safety (yes or no), etc.

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DATA COLLECTION: TYPES OF DATA

Primary data is data, which is collected by the researcher themselves. This kind of data is new, original research information.

Primary sources enable the researcher to get as close as possible to what actually happened and is hands-on.

A primary source reflects the individual viewpoint of a participant or observer. Primary sources are first-hand information from a person who witnessed or participated in an event.

e.g. Observations, Interviews, and Questionnaires

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DATA COLLECTION: TYPES OF DATA

Secondary data is information that has already been produced by other people.

A secondary source is used by a person usually not present at the event and relying on primary source documents for information. Secondary sources usually analyse and interpret.

Finding out about research that already exists will help form new research.

e.g. Published Articles, Internet, Books/ Magazines, Newspapers, and Statistics.

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ANALYSING DATA

Not much can be conveyed by simply presenting a huge collection data in your report. Therefore, it is essential to **analyse** your data using appropriate techniques.

You are wasting your time and effort if:

- (1) You carry out analysis ***not relevant*** to the objectives of your study.
- (2) You collect data which you are which you are ***not able to analyse*** because you have either ***too much***, or because you have ***insufficient or inappropriate analytical skills*** to make the analysis.

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ANALYSING DATA

Quantitative analysis uses mathematical operations to investigate the properties of data.

The best way to conduct quantitative analysis is by using **statistics**.

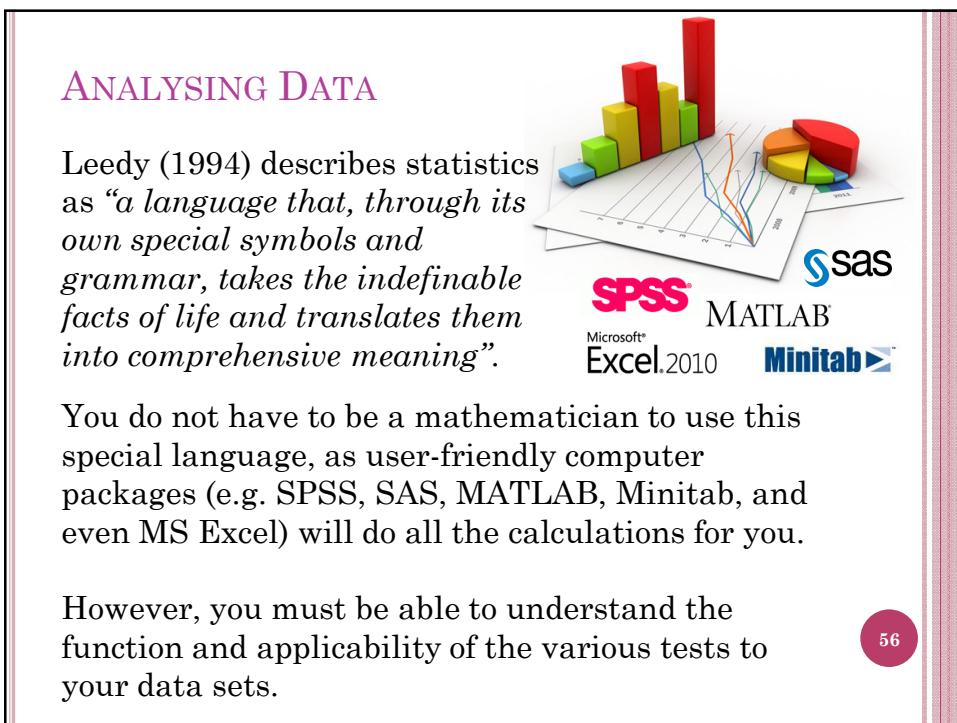
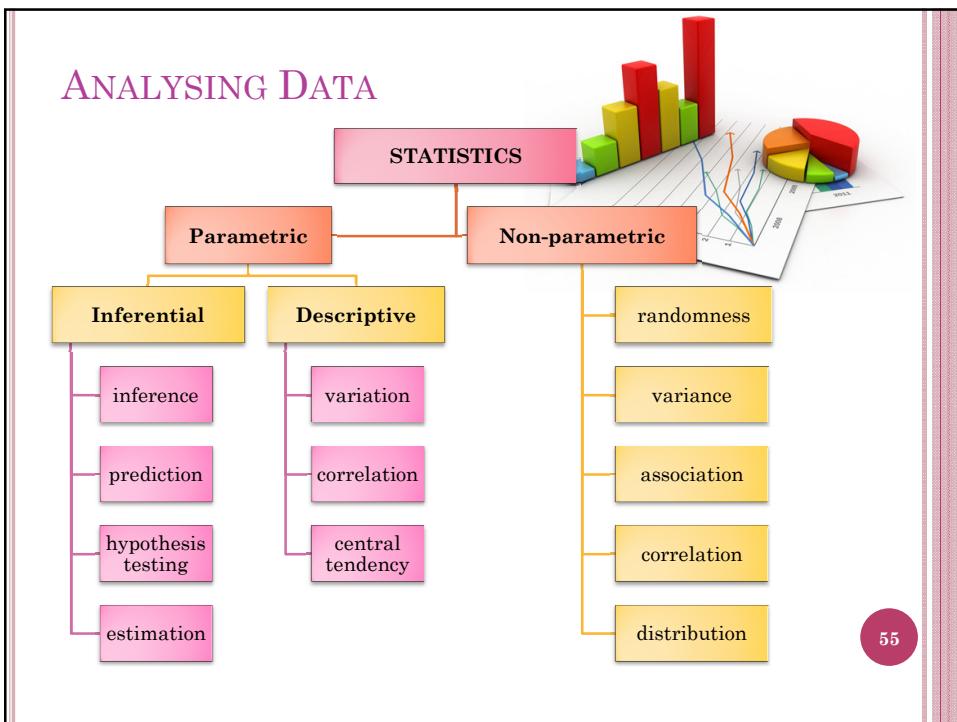
One of the primary purposes of scientific investigation is to discover relationships between variables so that we can explain, predict and control them. Statistical methods serve as a valuable tool for discovering and quantifying these relationships.

Rule #1 Always consult a qualified statistician.



Rule #2 Know enough about statistics to be able to view the advice critically.

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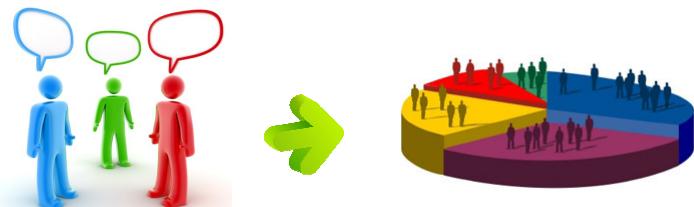


ANALYSING DATA

Qualitative analysis expresses the nature of elements and is represented as new concepts and theory.

Qualitative analysis tools include:

- (1) Categorisation and theme-based analysis
- (2) Quantitative analysis on text-based data using statistical packages (e.g. SPSS, SAS, etc)



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PRESENTING YOUR FINDINGS

After analysing your data, you will need to present the findings of your research. This should be done effectively in the **Results and Discussion** chapter of your final report.

Presenting your results well, using words and graphics, is an important skill that you will have to learn. You will need to:

- (1) Properly use text and visual aids
- (2) Interpret the results
- (3) Use proper language of reporting
- (4) Refer to figures or tables correctly

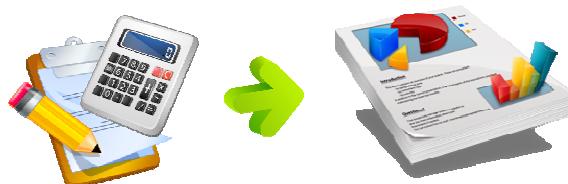
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PRESENTING YOUR FINDINGS

Properly Use Text and Visual Aids

Present your findings in words with the aid of tables, charts and graphs in order to make your findings clear and easy to understand.

Remember, you should **write** a report and not **draw** a report. **The text is primary.** The graphics are only there to support the text.



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PRESENTING YOUR FINDINGS

Example

5.3 Extent of knowledge of CPR

As can be seen from Figure 5.10, only 21% of the respondents reported knowing how to administer CPR.

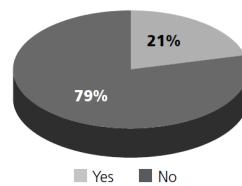


Figure 5.10: Percentage of respondents who know how to do CPR

This is a surprising finding, considering the many opportunities offered to the public to learn emergency procedures. This finding may also be deemed worrying given that government efforts to train the public to be ready for emergencies are central to the concept of total defense.

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PRESENTING YOUR FINDINGS

Interpret the Results

You not only need to **report data**, but you also need to **interpret data**, which is to say what the data means in relation to your research question.

Example:

Reporting data

The majority of the respondents (70%) said that they had to wait for more than half an hour before being able to board the bus to KLCC, between 7.00 and 8.30am.

Interpreting data

The finding indicates that the frequency of bus service to KLCC in the morning peak hours is inadequate.

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PRESENTING YOUR FINDINGS

Use Proper Language of Reporting

Example:

Inappropriate

 From the survey, 36% of the respondents feel that ...

 From interviews with students, they do not benefit from ...

(It was not FROM the survey/interview that the respondents felt that way!)

 According to the respondents, they say that ...

(Redundant!)

Appropriate

 The survey shows that 36% of the respondents feel that ...

 From interviews with students, it was found that they do not benefit from ...

 The respondents say that ...

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PRESENTING YOUR FINDINGS

Refer to Figures or Tables Correctly

If you include any figure or table in your report, you should:

1. Number it and give it a concise, accurate caption.
2. Draw the reader's attention to the figure or table in your text.
3. Make sure that the figure or table is located **after** the text that mentions it.

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PRESENTING YOUR FINDINGS

Refer to Figures or Tables Correctly

A common mistake students make is:



Referring to Table 3.7, the turbidity of water ... (*Who is referring?*)

Students should instead write:



As can be seen from Table 3.7, the turbidity of water ...



Table 3.7 shows that the turbidity of water ...

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PRESENTING YOUR FINDINGS

When presenting findings, you should be **objective**, meaning that you should report data **without any biased comment**.

For example:

The survey shows that an overwhelming percentage of the respondents (83%) feel that punishing cyber bullies is not necessary, which is a rather disappointing finding.

The words “overwhelming” and “disappointing” clearly shows that the author has a biased feeling and attitude towards the subject in question!

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CONCLUDING YOUR REPORT

The final stage of your report writing is the closing chapter that includes **conclusions** of your research.

Conclusions are shorter sections of academic texts which:

1. Summarise and bring together the main areas covered in the writing.
2. Provide a final comment.

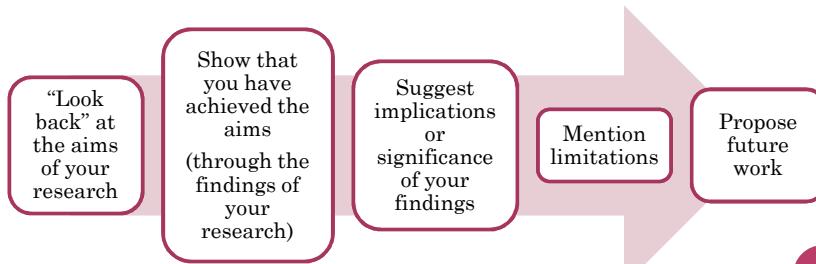
The final comment may also include making suggestions for improvement and speculating on future directions.

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CONCLUDING YOUR REPORT

In research papers, conclusions tend to be more complex and will also include:

- Significance of the findings
- Limitations of the current study
- Recommendations for future work



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PROJECT PROPOSAL (FOR FYP1)

A project proposal is a *persuasive document*. The objectives of a proposal are to:

1. Identify what work is to be done.
2. Explain why this work needs to be done.
3. Show that you are capable of doing the work, have a credible management plan and technical approach, and have the resources needed to complete the task within the specified time.



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STRUCTURE OF YOUR PROJECT PROPOSAL

Your **proposal** should contain the following:

1. Abstract
2. Introduction
 - (a) Background of study
 - (b) Problem statement
 - (c) Objectives
 - (d) Scope and limitations
 - (e) Contribution of study
3. Literature review
4. Methodology
5. Expected results
6. References
7. Plan of action and milestones (Gantt chart)



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FINAL REPORT (FOR FYP2)

The final report is an academic writing that comprehensively details the undergraduate student's research work and findings.

It is also a document that is submitted as partial requirement for the award of an academic degree.

Therefore, the student must invest much time and effort into completing the final report so that it meets all requirements, particularly content and format.

Refer to "*UTHM Thesis Writing Guide*".



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STRUCTURE OF YOUR FINAL REPORT

Your **final report** should contain the following:

1. Abstract
2. Introduction
 - (a) Background of study
 - (b) Problem statement
 - (c) Objectives
 - (d) Scope and limitations
 - (e) Contribution of study
3. Literature review
4. Methodology
5. Results & Discussion
6. Conclusions
7. References



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TECHNICAL PAPER (FOR FYP2)

Students will have to produce a **technical paper** for the FYP 2 Seminar.

The paper must be written in English or Bahasa Malaysia, must be between six (6) and ten (10) pages, and must comply with the format prescribed by the faculty.

*Your technical paper is **not** a condensed version of your final report!*



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TECHNICAL PAPER (FOR FYP2)

To prepare the technical paper:

1. Identify a particular finding of your research that you think has great significance or implication in your field of research.
2. Extract (from your final report) the literature, research methods, data, analysis, results and references in relation to that finding.
3. Come up with an appropriate title and abstract.
4. Write your paper (you may use text and graphics from your final report, but use them sparingly).

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STRUCTURE OF YOUR TECHNICAL PAPER

Your **technical paper** should contain the following:

1. Abstract
2. Introduction
3. Materials & Methods
4. Results & Discussion
5. Conclusions
6. References



Follow the technical paper format prescribed by the FKAAS. 

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TIPS FOR EFFECTIVE PRESENTATIONS

Powerpoint presentation slides:



- 1) Font size should be big enough to be seen from the last row.
- 2) Do not put too much text on each slide.
- 3) Include some images.
- 4) Font colour and background colour should contrast each other.
- 5) Avoid using bright colours for the background.
- 6) Be consistent with slide design, colour theme and font style.
- 7) Animation is cool, but do not overuse it.
- 8) You have 10 minutes to present, so do not prepare too many slides.

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TIPS FOR EFFECTIVE PRESENTATIONS

Poster:



- 1) Your poster should have these components: Abstract, Introduction, Method, Results and Discussion (in this order).
- 2) You may also include Acknowledgements and References at the end.
- 3) Avoid clutter: Organise your components well. They should be read from left to right, and top to bottom.
- 4) Keep the lettering simple: Use no more than three different font sizes. The smallest font should be large enough to be read from 1.5 m away (usually 24 pt).

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TIPS FOR EFFECTIVE PRESENTATIONS



Poster:

- 5) For long blocks of text, do not use ALL CAPS and use *serif* fonts, which are easier to read.

Serif FontSans-serif Font
- 6) Keep the colours simple: Use no more than three colours. Text and background should contrast each other. Some colours do not go along too well.

Headache!Yikes!
- 7) If you are inserting images, they should be clear (high resolution) and should not take up space.

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TIPS FOR EFFECTIVE PRESENTATIONS



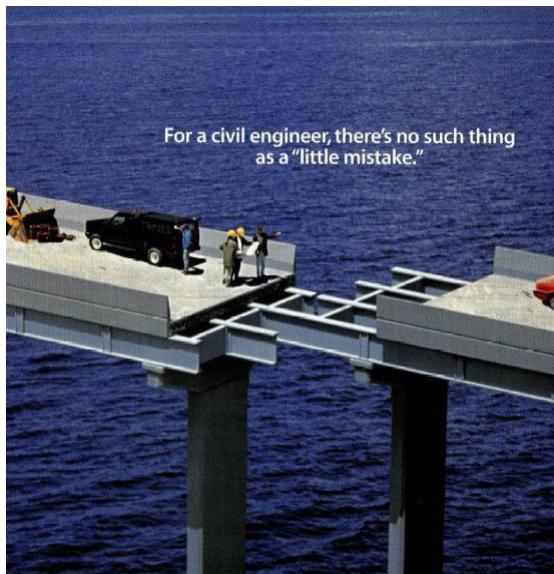
Oral presentation:

- 1) Practice your presentation as many times as possible, and time yourself.
- 2) Avoid reading from the screen or notes when you present. Remember, you should be speaking, not reading!
- 3) Do not turn your back against the audience.
- 4) Maintain eye contact with your audience and mind your body language.
- 5) Always remember that the audience wants you to succeed. So, do not be intimidated by them.
- 6) Stay calm, be confident and just relax.

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THE END.

For a civil engineer, there's no such thing
as a "little mistake."



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PAPER TITLE (Times New Roman 14, centered)

Student as Main Author, Supervisor as Co-Author [Author's full name, Time New Roman 10, centred]
Department, Name of University, City [Times NR 10]

Corresponding E-mail : main-author@webmail.com, co-author@webmail.com [Times NR 10]

Abstract [Times NR 12]

Abstract of the paper should not exceed 300 words in length; paragraph should be justified with 1cm indent on both sides. Use Times New Roman 10. The abstract should summarise the main contents of the paper. It should focus on literature justification, main objective, methodology and results of the research.

Keywords: word, term, phrase [3 to 5 keywords, Time NR 10, Italic]

1.0 Introduction [Times New Roman 12]

This document serves as a template as well as a guide to authors for the submission of a technical paper as partial requirement of completing FYP 2.

The paper must be of size A4. The body of paper should be formatted in a single (one) column, with margins set at 2.54 cm (1") from top, bottom, left and right. Use Times New Roman font pt 11, justified on both sides. Use single spacing. The main headings and sub-headings must be Times New Roman font pt 12 and in bold letters.

The technical paper must be between **six (6) and ten (10) pages** and must be **written either in English or Bahasa Malaysia**. Authors must comply with the technical paper format determined by the Faculty. Read the instructions carefully. Authors are responsible for all the material presented in the paper.

The paper must be submitted in hardcopy, as well as in MS Word document format to the Supervisor by Week 12 of the academic calendar.

2.0 Paragraph [Times NR 12]

The first line is to be indented 1 cm to indicate the beginning of each paragraph. Do not change your font sizes or line spacing, and try to avoid using headers, footers and footnotes. The reference should be mentioned with number in closed bracket [1]. For multiple references in sequence it should be used as [2-5]. For references not in sequence it should be separated by comma [1, 3, 5].

2.1 Figures and Tables [Times NR 12]

All figures must carry numbers in the text (e.g. Fig. 1) and captions. Captions should be complete enough to allow understanding of the illustration without referring to the text. In addition, a source of the image other than the author's own archive should be placed directly under the image (author, year) and the font size of the source description should be 1pt smaller than the caption, i.e. pt 10. Use single blank lines before and after the image.



[Times NR 11]**Figure 1:** FKAAS building (Images centred on the page)
[Times NR 10]Source: (Maniaxor, 2011)

If table data is from another source, cite the source at the bottom-right of the table and include it in the Reference Section (see example). Each table should be given a brief title and consecutively numbered. Place them as close as practicable to the relevant part of the text. Insert single blank lines before and after the table. Avoid using colors unless it is necessary for the proper interpretation of your figures.

Table 1: Population of the World (centered on the page)

Rank	Country	Population	Date of Estimation	% of world population
	Content Font size	[Times NR 10-11]		
1	People's Republic of China	1,339,724,852	November 2010	19.35%
2	India	1,210,193,422	March 2011	17.48%
3	United States	311,515,000	June 2011	17.48%
4	Indonesia	237,556,363	May 2010	17.48%
5	Brazil	190,732,694	August 2010	17.48%

[Times NR 10]Source: (Author, year)

3.0 Materials and Methods [Times NR 12]

Materials and methods are explained here.

4.0 Results and Discussions [Times NR 12]

Results and discussions are presented here.

5.0 Conclusions [Times NR 12]

Conclusions are provided here.

Acknowledgement [Times NR 12]

This section is optional.

References [Times NR 12]

References should be numbered consecutively throughout the text. References should be listed in order of citation, at the end of the paper, after one clear line, numbered in square brackets [] in Times New Roman pt 10. Refer simply to the reference number, as in [3], do not use "Ref. [3]" or "reference [3]" except at the beginning of a sentence: "Reference [3] was the first . . ." Please ensure that every reference cited in the text is also present in the reference list (and vice versa). References will be given in the original language, using only Roman alphabet (use transliteration if necessary). For references with more than one author, include the names of all authors (do not use et al or other abbreviations).

The list of all sources referred should be arranged according to numbers in ascending order using IEEE Format as follows:

- [1] H. Memon, I. A. Rahman, M. R. Abdullah, and A. A. A. Azis, "Factors Affecting Construction Cost in Mara Large Construction Project: Perspective of Project Management Consultant," International Journal of Sustainable Construction Engineering & Technology, vol. 1, pp. 40-53, 2010.
- [2] J. Cohen, "Statistical power analysis for the behavioral sciences," 2nd ed., 1988.
- [3] Z. M. Daud, M. H. Ahmad, and F. Yusof, "Elementary Statistics," Prentice Hall, Pearson (M) Sdn Bhd, 2009.



THESIS WRITING GUIDE

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**Fourth Edition
First Printing 2012
THESIS WRITING GUIDE
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PREFACE

This **Thesis Writing Guide** is published by the Centre for Graduate Studies specifically to assist students in writing theses and project reports that are consistent with internationally accepted academic norms in terms of style and format. The specific use of the word “**thesis**” in this guide refers to the academic writings submitted in fulfillment of the requirements for the award of the doctoral degree or the masters by research degree. All discussions in this guide also use the word “**thesis**” to refer to academic writings for the *undergraduate project (PSM)*, *Master’s Project Report* and *Research Dissertation for study by mixed-mode*. However, this guide is not meant to provide exhaustive formatting styles for all forms of references. If a specific formatting style is required but is not in this guide, please refer to the 6th Edition of the American Psychological Association Manual.

Centre for Graduate Studies
Universiti Tun Hussein Onn Malaysia
Senate: 21 December 2011

ACKNOWLEDGEMENTS

The Centre for Graduate Studies of Universiti Tun Hussein Onn Malaysia (UTHM) would like to extend its appreciation to the members of staff who contributed their efforts and ideas in the preparation of this fourth edition of the **Thesis Writing Guide**. This manuscript was updated based on the third edition published in 2006. The Centre would also like to thank all parties involved in the publication of the manuscript.

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CHAPTER 1

THESIS STRUCTURE AND CONTENT

1.1 Definition

The specific use of the word “thesis” in this guide refers to the academic writings submitted in fulfillment of the requirements for the award of the doctoral degree or the masters by research degree. The word “thesis” is also used in general to refer to the master’s project report and research dissertations, which are the documents submitted in partial fulfillment of the requirements for the award of the degree of masters by coursework or mixed-mode, as well as the undergraduate project reports.

1.2 Structure

A thesis is made up of several sections, arranged in the sequence shown in Table 1.1.

Table 1.1: Sequence of contents

NO.	SECTION	REQUIREMENT	EXAMPLE (APPENDIX)	REMARKS
1	Blank Page	-	-	-
2	Declaration of Thesis Status	Required	A1/ A2/ A3/A4	Unnumbered
3	Examiners’ Declaration	Required	B	Unnumbered

Table 1.1 (continued)

NO.	SECTION	REQUIREMENT	EXAMPLE (APPENDIX)	REMARKS
4	Title	Required	C1/ C2/ C3	Unnumbered but considered as (i)
5	Student's Declaration	Required	D1 /D2	Lowercase Roman numeral (ii)
6	Dedication	Optional	E	Lowercase Roman numeral
7	Acknowledgements	Optional	F	Lowercase Roman numeral
8	Abstract	Required	G1a/ G1b/ G2a G2b	Lowercase Roman numeral
9	Contents	Required	H	Lowercase Roman numeral
10	List of Tables	Required	I	Lowercase Roman numeral
11	List of Figures	Required	J	Lowercase Roman numeral
12	List of Symbols and Abbreviations	Required	K	Lowercase Roman numeral
13	List of Appendices	Required	L	Lowercase Roman numeral
14	Text	Required	M	Arabic numeral starting with the page number
15	References	Required	P1/P2	Arabic numeral continued with text
16	Appendices	Optional	-	Arabic numeral continued with text
17	Vita	Required	Q	Unnumbered

1.3 Declaration of thesis status

The status of a thesis must be declared by completing the Thesis Status Form as shown in **APPENDICES A1-A4**. If a thesis is to be classified as confidential or limited, a letter seeking this classification must be obtained from the organisations concerned and submitted to the Dean of the Centre for Graduate Studies, the Dean of the Faculty or related academic centres. The approval letter must state the reasons for and duration of the classification. The typical duration for this classification is three years.

Where an author classifies a thesis as unlimited, the University shall assume that the thesis is non-confidential. Copies of the thesis can be made and used by Universiti Tun Hussein Onn Malaysia.

1.4 Viva voce examination panel

The names of the members of the viva voce examination panel shall be included as shown in **APPENDIX B**. This page is not applicable for the master's project report or the undergraduate project report.

1.5 Title

The title page must contain the following information in the following order:

- (i) Title of the thesis;
- (ii) Full name of the student;
- (iii) Statement on the purpose of the thesis submission;
- (iv) Name of the faculty or centre where the student is registered;
- (v) Name of the University; and
- (vi) The month and year the thesis was written and accepted. Theses for the Master's degree by research and the Doctor of Philosophy degree must be approved by the Graduate Studies Committee (Jawatankuasa Pengajian Siswazah), whilst others must be approved by the relevant committee.

(Please refer to **APPENDICES C1-C3**)

1.6 Declaration

The declaration page contains a statement declaring the originality of the thesis. It must be signed by the author. Please refer to **APPENDICES D1-D2**.

1.7 Dedication (optional)

The dedication message must be concise, must not exceed one paragraph and must not contain any numbers, graphs or figures. Please refer to **APPENDIX E**.

1.8 Acknowledgements (optional)

Acknowledgements must be written on a single page only. Its purpose is to record the author's appreciation for individuals or organisations that provided their assistance either directly or indirectly in the preparation of the thesis. Please refer to **APPENDIX F**.

1.9 Abstract

The abstract is a short summary of the thesis. It should describe the rationale and objectives (problem statement), the methodology, as well as the findings and conclusion of the study undertaken. The abstract must not be longer than 250 words for a Master's thesis or Master's project report and not longer than 350 words for a Doctoral thesis written in two languages, Bahasa Melayu and English. For a thesis written in English, the abstract must be written in English first followed by its Malay translation on the next page. Do not include any literature review, unexplained abbreviations, limitations or suggestions for future research in the abstract. It must be written with a spacing of one and a half (1½) lines. Please refer example abstract for engineering at **APPENDIX G1a** and **APPENDIX G2a** and example abstract for social science at **APPENDIX G1b** and **APPENDIX G2b**.

1.10 Table of contents

The table of contents must begin on a new page. The information is organised by chapter, topic and page number. Every chapter, topic and page number shown in the table of contents must correspond to the same chapter, topic and page number in the thesis. Sub-titles may be displayed up to three levels only. Please refer to **APPENDIX H**.

1.11 List of tables

This page contains a list of all tables presented in the thesis. Information such as table numbers, table captions and the corresponding page numbers where the tables

appear must be shown clearly in the list. The list must be ordered by chapter. Please refer to **APPENDIX I.**

1.12 List of figures

All illustrations included in the text such as maps, charts, drawings, graphs, pictures and photos are considered as ‘Figures’. The list of figures contains all the figure numbers, titles and the corresponding page numbers on which they appear. The list of figures must be ordered by chapter. Please refer to **APPENDIX J.**

1.13 List of symbols and abbreviations

This page lists down all the symbols, abbreviations, nomenclature and terminology used in the text. The order of writing them is as follows:

Roman letter	-	alphabetical order
Greek letter	-	alphabetical order
Superscript	-	alphabetical order
Subscript	-	alphabetical order

Please refer to **APPENDIX K.** For further information on spelling and abbreviations, students are advised to refer to the latest edition of the Oxford Advanced Learner’s Dictionary published by Oxford University Press.

1.14 List of appendices

This page lists down the appendices included with the thesis. Please refer to **APPENDIX L.**

1.15 Text

Text in the thesis must be organised in titled chapters. The titles must reflect the content of the chapter. Every chapter must begin on a new page. Chapters can be divided into sub-chapters with corresponding sub-titles. Titles and sub-titles must be

numbered. Please refer to **APPENDIX O**.

There is no restriction on the total number of chapters in a thesis. Generally, a thesis will have the following basic structure.

(a) Introduction

This chapter describes the aim, objectives and scope of the research as well as the structure of the thesis.

(b) Literature review

The literature review is a critically written and comprehensive account of the published works on a topic by accredited scholars and researchers. It is directly related to the thesis, providing information on theories, models, materials and techniques used in the research.

(c) Methodology

This important chapter explains in detail the samples, instruments, materials, procedures and data gathering methods used in the research.

(d) Data analysis and results

This chapter explains the data analysis techniques and results through written text, figures, tables, and/or other means.

(e) Discussion and conclusions

In this chapter, the writer discusses the results and research findings by comparing them with the previous research work mentioned in the literature review chapter. Conclusions are drawn based on the research findings and their implications. Future works are also discussed.

Students who need to translate their theses are advised to refer to the latest edition of *Gaya Dewan Bahasa dan Pedoman Translasi* published by Dewan Bahasa dan Pustaka.

1.15.1 References in the text

When an information or idea is taken from a source, the author of the source must be acknowledged in the text. References cited in the text must be written according to the style prescribed in **CHAPTER 3: FORMAT OF REFERENCES**.

1.15.2 Tables in the text

All tables must be numbered using Arabic numerals. Table numbers must be linked to the chapter number. For example, the third table appearing in Chapter 4 is numbered, “Table 4.3”. The caption for a table is placed 1.5 lines above the table and written in Times New Roman font, size 12 without a period at the end and left justified with single line spacing between lines. The text in the table must be written using Times New Roman font, size 10 and single line spacing between lines. If a table extends beyond the end of a page, its continuation on the next page must, for example, be labeled, “Table 4.3 (continued)”. As an example, please refer to Table 1.1 on pages 1-2. If a table is taken from a particular source, the source must be stated at the end of the caption. Please refer to **APPENDIX N**. A table can only be presented after it is cited in the text. All tables that appear in the text must be listed in the list of tables as shown in **APPENDIX I**.

1.15.3 Figures in the text

All figures must be of high quality and numbered using Arabic numerals. Figure numbers must be linked to the chapter number. For example, the third table/graph/chart/etc appearing Chapter 4 is numbered, “Figure 4.3”. The caption for a figure is placed 1.5 lines below the table/graph/chart/etc and written in font size 12 without a period at the end with single line spacing between lines. If a figure extends beyond the end of a page, its continuation on the next page must, for example, be labeled, “Figure 4.3 (continued)”. If a figure is taken from a particular source, the source must be stated at the end of the caption. Please refer to **APPENDIX N**. A figure is best placed immediately after it is cited in the text. All figures that appear in the text must be listed in the list of figures as shown in **APPENDIX J**. Illustrations in diskettes, on slides or in other similar mediums must be placed inside a specially made pocket attached on the inside back cover of the thesis. Illustrations with large dimensions, such as plans and maps, must be reduced in size to fit into a single page. Illustrations must comply with the following conditions:

1.15.3.1 Photographs

Photographs used as illustration must be affixed in the text using high quality glue or other better techniques.

1.15.3.2 Newspaper and other clippings

A clear and high quality photocopied version of the actual clipping must be used instead of the original.

1.15.3.3 Maps and aerial photographs

Maps and aerial photographs intended to be included in a thesis must have obtained prior written permission from the *Ketua Pengarah Pemetaan Negara* (Director General of National Mapping). Illustrations must be scanned and printed using a high resolution colour printer.

1.15.4 Mathematical equations

Mathematical equations must be numbered using Arabic numerals. Equation numbers must be written at the end of the equation and linked to the chapter number. For example, the numbers (4.3) and (4.4) are given to the third and fourth equations respectively that appear in Chapter 4, as follows:

$$y^2 = 3x^2 + 3xy + C \quad (4.3)$$

$$\begin{aligned} z = & 10x^6 + 9y^5 + 8^4 + 7y^6x^5 + 6y^5x^4 + 5x^4 + 4y^4x^3 + 3y^3x^2 + \\ & 2y^2x + yx \end{aligned} \quad (4.4)$$

1.16 References

References are the sources referred to when preparing a thesis and cited in the text of the thesis. Thesis writers are required to list down all cited materials in the list

of references (refer to **APPENDIX P1** and **APPENDIX P2**). The list of references must be prepared according to the format prescribed in **CHAPTER 3: FORMAT OF REFERENCES**.

1.17 Appendices (optional)

The appendix section gives an author the opportunity to include materials that can provide additional information in the text to support the study. These materials include tables, charts, computer programmes and questionnaires. Here are some guidelines for the appendix.

- (a) Research data, tables, examples of questionnaires, maps, photos and other materials that are too long to be included in the text or are not directly required to comprehend the text can be included as appendices. Generally, tables and graphics that are more than two pages long should be put in the appendix section.
- (b) Appendices are labelled as APPENDIX A, APPENDIX B, etc depending on the type and quantity of the materials. Appendices can also be given specific titles.

1.18 *Vita*

Students must provide a one-page “*Vita*” of themselves to be placed at the end of the thesis after the appendices. This “*Vita*” page is unnumbered. See **APPENDIX Q** for an example of the “*Vita*” page.

CHAPTER 2

SIZE AND FORMAT

2.1 Paper quality and size

Only high quality A4 size (210 mm x 297 mm) white simili paper, weighing 80 grams, may be used for the thesis.

2.2 Margin

The margins should be 4 cm from the left, 2.5 cm from the top, 2.5 cm from the right and 2.5 cm from the bottom, on every page including the cover.

2.3 Page numbering

Number the pages according to the sequence given in Table 1.1. The page number must be written at the top right corner, 1.5 cm from the top and 2.5 cm from the right, measured from the last digit of the page number. The page numbering system must conform to the following rules:

- (i) The preface of the thesis, starting from the title page, must be numbered using lower case Roman numerals (i, ii, iii and so on); the text pages and the rest of the thesis must be numbered using Arabic numerals (1, 2, 3, and so on).
- (ii) The first page of the thesis, the title page, is an unnumbered page ‘i’.
- (iii) The first page of Chapter 1 is unnumbered but is considered as page ‘1’. The same applies to the first page of all the following Chapters, where the first

page is unnumbered but taken into account for the purpose of numbering the subsequent pages.

2.4 Numbering of chapters and sub-chapters

Chapters and sub-chapters must be numbered using Arabic numerals. Chapters are numbered CHAPTER 1, CHAPTER 2, CHAPTER 3, and so on. Sub-chapters are nested, but its numbering is not indented, up to a maximum of 4 levels as in the example shown below:

CHAPTER 2 First level (Chapter number)
2.1 Level 2 (sub-title);
2.1.1 Level 3 (sub-sub-title);
2.1.1.1 Level 4 (sub-sub-sub-title)

If a chapter title or sub-title at any level exceeds a single line, the spacing between the lines must be the same as that of the text. Subsequent sub-chapters beyond the fourth nesting level must be numbered using alphabets. The distance between the title number and the title is one (1) cm irrespective of its nesting level (refer to **APPENDIX R**).

2.5 Typing

The thesis should be typed out on a computer in Times New Roman font, size 12, and using Microsoft Word version 6.0 or later, except for tables and figures (refer to 1.14.2 and 1.14.3). Words in a language that is different from the language of the thesis must be typed in italics. The spacing between text lines should be 1.5 lines. Text should be typed on one side of a paper only.

Chapter titles should be typed with capital letters and centered between the left and right margins. Each chapter must begin on a new page. Chapters and sub-chapters should be titled. Titles should be typed in **bold** without underline. Only the first letter of the first word of a sub-title should be in uppercase.

2.6 Spacing and format

Students must adhere to the following text spacing guidelines:

- (i) The spacing between the upper margin and a chapter number is 2.5 cm.
- (ii) The spacing between the chapter number and the chapter title is 4 lines.
- (iii) The spacing between the chapter title and the first line of text is 2 lines.
- (iv) The spacing between a sub-title and the last line of the preceding text is 2 lines.
- (v) The spacing between a sub-title and the first line of the following text is 2 lines.
- (vi) There should be no spacing between paragraphs.
- (vii) Start a sub-title, including its numbering, from the left margin.
- (viii) Start the first line of text of the first paragraph below the sub-title without any indent, beginning from the left margin; the following paragraphs should be indented 1.27 cm from the left margin.
- (ix) Do not start the first sentence of a new paragraph at the bottom of a page if the space available can only fit one line.
- (x) The text should be left justified except for the first line of the first paragraph in a section. (Refer to (viii) above). The author is responsible for removing any excess space between words.
- (xi) The spacing between the last line of text and a Table, Figure or Illustration should be 1 line.
- (xii) The spacing between a period (.) and the first letter of the next sentence of the same paragraph is at least one (1) character.
- (xiii) The spacing after a comma (,) is at least one (1) character.

2.7 Printing of documents

Theses must be typed out using a computer and printed using a laser printer or a printer with an equivalent print quality.

2.8 Letterings and drawings

Letterings and drawings should be clear so that copies made will be of satisfactory quality without any loss of information.

2.9 Maximum number of pages

The maximum number of pages for a thesis is as follows:

Undergraduate Project Report:	should not exceed 100 pages
Master's Project Report and Thesis:	should not exceed 200 pages
Doctor of Philosophy Thesis:	should not exceed 300 pages

These limits **do not include tables, diagrams and other illustrations except appendices**. Students who intend to write a thesis that exceeds the given limit must obtain a written approval from the Dean of the Centre for Graduate Studies or the Dean of the Faculty (for undergraduate reports) by submitting an application through their supervisors.

2.10 Binding

All theses must be bound. A thesis must be temporarily bound (spiral binding) for the purpose of examination, and may only be hard-bound after obtaining the approval of the Graduate Studies Committee or other committee(s) for the related programme.

2.10.1 Cover colour and letterings

For submission to the University, theses must be permanently bound with buckram covers and gold letterings using regular Times New Roman font, size 18. The colour codes for the cover are as follows:

- (i) Doctor of Philosophy Thesis: Black (585)
- (ii) Master's Thesis: Moss Green (557)
- (iii) Undergraduate Project Report: New Blue (550)

2.10.2 Cover

The thesis cover must be of A4 size (210mm x 297mm). The title, author's name and the words 'Universiti Tun Hussein Onn Malaysia' must be written in capital letters on the front cover of the thesis, as shown in **APPENDIX S**.

2.10.3 Spine

The abbreviated name of the University, "UTHM", the author's name, the month and the year the thesis is approved* and the level of study must be stated on the spine, as shown in **APPENDIX T**.

***Date of status confirmation for undergraduate Project Report/Master's Project Report/Master's Thesis/Doctoral Thesis (Refer Appendix A1-A4)**

2.10.4 Trimming

The thesis can only be trimmed by 2.5 mm on each side of the A4 paper during binding.

CHAPTER 3

FORMAT OF REFERENCES

3.1 Introduction

Sources that are referred to in a thesis, whether published or not, must be stated. The source of information must be acknowledged in the text as well as in the reference list. Proper acknowledgement is important because it will help others locate and verify the original sources. Furthermore, proper citation can avoid allegations of plagiarism. Acknowledgements in the text must be linked to the list of reference using the “Author (Date)” system or the “Number (IEEE) Format”.

3.2 Author (Date) System

The system is also known as the American Psychological Association (APA) system.

3.2.1 Citing references in the text

A reference can be written in a sentence itself or at the end of a sentence.

- (a) In the Author (Date) style, the year of publication must be placed in brackets after the name of the author. For example;

According to Mohamed (2005), a large proportion of scheduling problems in the various sectors, such as economic and engineering, can be classified with a class of problems known as constrained optimisation.

- (b) If a reference is not cited in the sentence itself, the author’s name and year of

publication must be written within brackets. For example;

Therefore, research on effective solution methods for constraint optimisation has become the focus of current research (Mohamed, 2005).

- (c) If a source of reference is authored by two people, state both authors' names.

For example;

Maintenance scheduling has been researched for a long time, for example in the generation of power by Kralj & Petrevic (1995)...

- (d) If a reference contains three authors, state all three names the first time it is referred to in the text. For the second and subsequent times it is mentioned, state only the first author's name followed by "*et al.*" and year. For example;

A study by Alias, Black & Gray (2002) shows that engineering students have lower spatial visualisation ability than required. Since this ability is important in solving engineering problems, it needs to be improved among engineering students (Alias *et al.*, 2002).

- (e) For a reference with four or more authors, state only the name of the first author followed by "*et al.*" and year.

- (f) Use lowercase letters (a, b, c) to differentiate between two or more publications published in the same year by the same author. For example;

An example of an application that uses a constraint programming language is ILOG Solver by Puget and Albert (1994a). In addition, Puget and Albert (1994b) also found that the use of object is widespread, especially within artificially intelligent programming.

- (g) Secondary sources may not be cited. Thesis authors must refer to the original reference source. An example of a secondary source is given below:

Ali (in Abu, 2000) emphasised that

3.2.2 Writing cited information

There are three main ways to acknowledge the source of an idea or information cited in the text, namely (a) quotation, (b) paraphrasing and (c) summarising. The examples that follow are based on the following excerpt:

Biological time is not only scientifically important, but it also greatly affects the productivity and health of a nation. The cost to the nation's health of working out of phase with our biological clocks is probably incalculable at present. In the short term, poor sleep, gastrointestinal problems, higher accident rate, and social problems are evident. (p. 1000)

Source: Rajaratnam, S. (2001). Health in a 24-hr society. *Lancet*, 358, pp. 999 – 1005.

3.2.2.1 Quotation

Words of an author may be quoted exactly by the writer to support an argument. When a direct quotation from a source is taken, it should run into the text with double quotation marks if it is reasonably brief (three (3) or less sentences) with the end-of-sentence period in the normal place.

(a) Emphasis on the writer

To give emphasis to the writer, the author's name is written at the beginning of the sentence. For example;

Rajaratnam (2001) concluded that, “The cost to the nation’s health of working out of phase with our biological clocks is probably incalculable at present.” (p. 1000). Furthermore...

(b) Emphasis on the idea

To emphasise the idea, the author's name is written at the end of the sentence. For example;

A lot of discussion has been made on the cost of working out of phase with our biological clocks. “The cost to the nation’s health of working out of phase with our biological clocks is probably incalculable at present” (Rajaratnam, 2001, p. 1000). Therefore, ...

A quotation containing more than three sentences must be set off from the text as a paragraph on its own with 1 cm indent, placing the period at the end of the quoted text with no period after the reference citation page number. Single spacing should be used for block quotations. For example;

According to a renowned scholar (Rajaratnam, 2001),

Biological time is not only scientifically important, but it also greatly affects the productivity and health of a nation. The cost to the nation's health of working out of phase with our biological clocks is probably incalculable at present. In the

short term, poor sleep, gastrointestinal problems, higher accident rate, and social problems are evident. (p. 1000)

3.2.2.2 Paraphrasing

The paraphrasing method is used to acknowledge information taken from the original author by rewording the original text without altering its meaning nor providing the writer's own interpretation. For example;

Rajaratnam (2001) argues that while the notion of biological time is of scientific importance, it is also economically and socially significant at a national level. He points to the health, productivity and social problems which may be attributed to individuals working “out of phase” with their internal clocks.

3.2.2.3 Summarising

The writer may summarise cited text in his/her own words to present the key points of an author's arguments or ideas, without altering the meaning. For example;

In his conclusion, Rajaratnam (2001) points to the possible economic and social costs incurred by a nation, when individuals work “out of phase” with their biological clocks.

3.2.3 Writing the reference list

All sources of reference that are cited in the thesis must be listed at the end of the text under the title “**REFERENCES**”. Do not use the word “**BIBLIOGRAPHY**” because it indicates a list of all sources that was referred to including those not cited in the text. The reference list must be in alphabetical order. Two or more sources by one author must be listed in chronological order. For example a 2002 publication by Suradi must be listed before his 2007 publication.

3.2.4 Writing the names of authors

In general, an author's surname (family name) or patronymic name (father's name) is written first followed by the initials of his/her other names. This is a common system used in academic writing internationally. Examples of how to write an author's name are as follows:

- (i) Name : John Neville Pavlovic
Written as : Pavlovic, J. N.
- (ii) Name : Mohd Noor Abdullah
Written as : Abdullah, M. N.
- (iii) Name : Syed Muhammad Naquib Al-Attas
Written as : Al-Attas, S. M. N.
- (iv) Name : Malik ibn Anas
Written as : Ibn Anas, M.
- (v) Name : Tan Beng Keat
Written as : Tan, B. K.
- (vi) Name : Raymond Tan Beng Keat
Written as : Tan, R. B. K.
- (vii) Name : Srinivasan Venkataraman
Written as : Venkataraman, S.
- (viii) Name : S. N. Gupta
Written as : Gupta, S. N.
- (ix) Name : Pretam Singh
Written as : Singh, P.
- (x) Name : Yasunori Matsufuji
Written as : Matsufuji, Y.

3.2.5 References from different types of sources

In thesis writing, references can be made to various types of sources. The following examples can be used as a guide in writing the different types of sources in the reference list.

3.2.5.1 Books

The major elements that must be included when an article is taken from a book are as follows:

Author (Year). *Title of book*. Edition. Location: Publisher.

An example of a reference by one author;

Race, P. (2002). *How to Get a Good Degree: Making the Most of Your Time at University*. Buckingham: Open University Press.

An example of a reference by two or three authors;

Creme, P. & Lea, M. R. (2003). *Writing at University*. 2nd ed. Maiden: Open University Press.

Delamont, S., Atkinson, P. & Parry, O. (2004). *Supervising the Doctorate: A Guide to Success*. 2nd ed. Maidenhead: Society for Research into Higher Education & Open University Press.

For publications that have more than one author, the word “and” and “dan” is replaced by the symbol “&”. If the book has an editor, the name of the editor must also be written. The general format is as follows:

Editor (Ed.) (Year). *Title of book*. Location: Publisher.

As an example;

Martin, A.M. (Ed.) (1991). *Peat as an Agent in Biological Degradation of Waste*. London: Elsevier.

The page numbers are required if the editor edits part of the book.

As an example;

Lees, R. H. (Ed.) (1974). *Chemical Nomenclature Usage*. Chischester: Ellis Horwood. pp. 314-362.

3.2.5.2 Articles from books

The major elements that must be included when an article is taken from a book are as follows:

Author (Year). Title of article. in Author. *Title of book*. Location:

Publisher. Page numbers.

For example;

Sarmani, S. (1987). Pencemaran Radioaktif. in Mohamad, A. B. (Ed.).
Perspektif Persekutuan. Petaling Jaya: Fajar Bakti. pp. 71 -87.

3.2.5.3 Articles from journals

The major elements that must be included when an article is taken from a journal are as follows:

Author (Year). Title of article. *Title of journal, vol. no.(issue no.),* page numbers.

For example;

Mikac, N. & Branica, M. (1994). Complexation of trialkyllead with diethyldithiocarbonate. *Electroanalysis, 6(2)*, pp. 37 – 43.

3.2.5.4 Corporate documents

The general format for corporate documents is as follows:

Name of corporate body (Year). *Title of document.* Location: Publisher.

For example;

Women's Law Center (2002). *Promise Still Owed to the Nation's Young Women.* Washington DC: Women's Law Center.

Engineers Joint Council (1969). *Thesaurus of Engineering and Scientific Terms.* New York: Engineers Joint Council.

If there is an editor, the general format is as follows:

Editor (Ed.) (Year). *Document title.* Location. Publisher.

For example;

Thomas, R. (Ed.) (1978). *Handbook for Authors of American Chemical Society Publications.* Washington, D. C.: American Chemical Society

3.2.5.5 Theses

The major elements that must be included when the information is taken from a

thesis are as follows:

Author (Year). *Title*. Name of institution: Level of thesis.

For example;

Abdullah, M. K. (1989). *Modeling of Swirling Fluidized Bed Hydrodynamic Characteristics*. Universiti Tun Hussein Onn Malaysia: Ph.D. Thesis.

Mat Ali, A. (2008). *Hubungan antara Gaya Pembelajaran Pelajar Kejuruteraan dan Pencapaian Akademik*. Universiti Tun Hussein Onn Malaysia: Master's Thesis.

Mohamed, B. (2008). *Design of Pavement on Soft Soil*. Universiti Tun Hussein Onn Malaysia: Master's Project Report.

3.2.5.6 Proceedings

The general format for writing a reference from a proceeding is as follows:

Author (Year). Title. *Proceeding*. Location: Publisher. Page numbers.

For example;

Alias, M. (2006). The Effects of Teacher Generated Concept Maps on the Learning of Secondary School Physics. *Proc. of the Second Int. Conf. on Concept Mapping*. San Jose. Universidad de Costa Rica. pp. 550-557.

3.2.5.7 Laws

The major elements that must be included when the information is taken from a law article are as follows:

Country (Year). *Name of laws*: Law number.

For example;

Malaysia (1983). *Perintah Monumen Lama dan Tapak Tanah Bersejarah*: P.U.(A)41 1983.

3.2.5.8 Standards

The major elements that must be included when the information is taken from a standard are as follows:

Name of institution (Year). *Name of standard*. Location: Standard number.

For example;

British Standards Institution (1987). *Tongued and Grooved Software Flooring*. London: BS 1297.

3.2.5.9 Patents

The major elements that must be included when the reference is a patent are as follows:

Owner (Year). *Name of patent*. Patent number.

For example;

Lindgren, E. A. (1960). *Screen Room Air Inlet and Wave Guard*. U.S. Patent 2, 925, 457.

3.2.5.10 Commercial catalogues

The major elements that must be included when the information is taken from a catalogue are as follows:

Producer (Year). *Title*. Location: Note.

For example;

Howick Partitioning Ltd. (1984). *Howick: Partitioning in Business*. Redhill (U.K.): Trade Brochure.

3.2.5.11 Measured technical drawings / map

The major elements that must be included when information is taken from:

(a) Measured technical drawing

Author (Year). *Title*. Location. Reference number. Note.

For example;

Sulaiman, Z. (2006). *Double Story Buildings: Perspective View*.

Universiti Tun Hussein Onn Malaysia. LT10-2006. Technical Drawing.

(b) Map

Author (Year). *Title [map]*. Location. Publisher

For example;

Derbyshire, E. et al. (2000). *Glacier map of Tasmania. [Map]*. London: Royal Geographical Society.

3.2.5.12 Newspaper clippings

The major elements that must be included when an article is taken from a newspaper are as follows:

Author (Date). Title of article. *Name of newspaper*. Page numbers.

For example;

Latiff, A. B. A. (2001, Februari 14). Hatinya telah dimiliki. *Utusan Mingguan*. p. 12.

3.2.5.13 Translated sources

The elements that must be included when information is taken from a translated source are as follows:

Original author's name. (Year of translation). *Title of book* (Name of translator, Trans.). Place of publication: Publisher. (Original work published Date)

For example;

Freud, S. (1970). *An outline of psychoanalysis* (Strachey, J., Trans.). New York: Norton. (Original work published 1940)

3.2.5.14 Unpublished sources

Unpublished sources used in a thesis should be stated with the word “Unpublished” added at the end.

3.2.5.15 Interviews

Interviews are not considered to be recoverable data, so no reference to interviews should be provided in the reference list. You may, however, cite the interview within the text as a personal communication. For example;

...students are not interested in community services (Hassan, A. R., personal communication, August 15, 2006)

3.3 Reference to electronic sources

The internet provides a vast opportunity for obtaining information. All Internet information obtained from sources that are cited in the text must be duly acknowledged in the text as well as in the reference list.

3.3.1 Citing references in the text

When quoting from an Internet source, use page number if available. If page numbers are not available, use other identifying information such as paragraph number. For example;

It was concluded that, “The cost to the nation’s health of working out of phase with our biological clocks is probably incalculable at present.” (Rajaratnam, 2001, para. 23).

If paragraph number is not available, state the heading of the section from which the quotation is taken and count the paragraphs starting from the heading to the paragraph containing the quotation. For example;

It was concluded that, “The cost to the nation’s health of working out of phase with our biological clocks is probably incalculable at present.” (Rajaratnam, 2001, Results, para. 3).

An example of the reference list system “Author (Date)” is given in APPENDIX P1.

3.4 Number System

3.4.1 Citing references in the text

All references mentioned in the text should be numbered using Arabic numerals. The first reference is given the number 1, the second reference given the number 2 and so on. One of the following methods can be used:

- i) If the author's name is written as part of a sentence, then the reference number should be placed in square brackets "[]" after the name of the author as in the following example:

According to Rajaratnam [1], the practice of working at hours that conflict with our biological clocks may lead to health disorders and losses for the country that cannot be assessed at this time.

- ii) If the author's name is not part of a sentence, then the reference number should be included in square brackets "[]" at the right places, as in the following example:

The study [1] shows that engineering students have a lower ability to visualise space than they should. Because this ability is important in solving engineering problems, it should be improved among students of engineering [2].

3.4.2 Writing styles for different types of publications in the reference list

The methods of writing the references in the list are as follows:

- i) Books

Writer. Title. Edition (if not the first). *Place of publication*. Publisher. Year.

Example:

Hornby, A.S.. *Oxford Advanced Learner's Dictionary of Current English*. 2nd Ed. Oxford: Oxford University Press. 1994

ii) Articles in Books

Writer. Title of article. In: The author of the book. *Titles*. Place of Publication: Publisher. Page numbers; year

Example:

Sarmani, S. Radioactive contamination. In: Mohamad, A. B. (Ed). *Environmental Perspectives*. Petaling Jaya: Fajar Bakti. pp. 71-87; 1987.

iii) Articles in Journals

Writer. Title of article. *Title of journal*. Year. Volume number (issue number): Page numbers.

Example:

Mikac, N. and Branica, M. Complexation of trialkyllead with diethyldithiocarbonate. *Electroanalysis*. 1994. 6(2): 37 – 43.

iv) Articles in Proceedings

Writer. Title of article. *Name of conference*. Date of conference. Place of publication: Publisher. Year. Page numbers.

Example:

Alias M. The effect of teacher generated concept maps on the learning of secondary school physics. *Second Int. Conference on Concept Mapping*. San Jose, Costa Rica: Universidad de Costa Rica. 2006. pp. 550-557.

v) Theses

Writer. *Title of thesis*. Level of thesis. Name of institution; year.

Example:

Abdullah, M. K. *Modeling of Swirling Fluidized Bed Hydrodynamic Characteristics*. Ph.D. Thesis. Universiti Tun Hussein Onn Malaysia; 2008.

vi) Standards

Name of institution. *Name of standard*. Place of publication, standard number. Year.

Example:

British Standards Institution. *Tongued And Grooved Software Flooring*. London, BS 1297. 1987

vii) Patents

Owner's name. *Name of patent*. Patent number. Year.

Example:

Lindgren, E. A. *Screen Room Air Inlet and Wave Guard*. U.S. Patent 2, 925, 457. 1960.

viii) Commercial Catalogues

Name of distributor. *Title*. Place of publication: Note. Year.

Example:

Howick Ltd partitioning. Howick: *Partitioning in Business*. Redhill (U.K.): Trade Brochure. 1984.

ix) Measured technical drawings

Name. *Title*. Place of publication: Note. Year.

Example:

Solomon, Z. Building Level Two: *Perspective Views*. Universiti Tun Hussein Onn Malaysia: Painting Technique. 2006.

x) Internet

Author Name. (Year). *Title [electronic version]*. Sub-title (if any). Retrieved on Month Day, Year, from URL

Example:

Wordnet (2006). *WordNet Search – 2.1*. Retrieved on November 30, 2006, from <http://wordnet.princeton.edu>

If a DOI is provided, use it instead of the URL. Example of a reference with a DOI is given below.

Kinchin, I. (2006). Developing PowerPoint handouts to support meaningful learning. *British Journal of Educational Technology*, 0(0). Retrieved August 23, 2007, from doi: 10.1111/j.1467-8535.2006.00536.x

In the reference list, the reference numbers in the text are listed in ascending order. An example of a reference list using the number system is given in Appendix P2.

REFERENCES

- American Psychological Association (2011). *What's New in the Sixth Edition of the Publication Manual*. Retrieved from <http://www.apastyle.org>
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- WordNet (2006). *WordNet Search – 2.1*. Retrieved November 30, 2006, from <http://wordnet.princeton.edu>

APPENDIX A1**UNIVERSITI TUN HUSSEIN ONN MALAYSIA****STATUS CONFIRMATION FOR UNDERGRADUATE PROJECT REPORT****MODELLING OF SWIRLING FLUIDIZED BED HYDRODYNAMIC CHARACTERISTICS****ACADEMIC SESSION : 2007/2008**

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(Contains restricted information as determined by the Organization/institution where research was conducted)

**FREE ACCESS**

Approved by,

(WRITER'S SIGNATURE)

(SUPERVISOR'S SIGNATURE)

Permanent Address:

NO2, TAMAN WIRA,
86400 PARIT RAJA
BATU PAHAT, JOHOR

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Date: _____

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APPENDIX A2**UNIVERSITI TUN HUSSEIN ONN MALAYSIA****STATUS CONFIRMATION FOR MASTER'S PROJECT REPORT****MODELLING OF SWIRLING FLUIDIZED BED HYDRODYNAMIC
CHARACTERISTICS****ACADEMIC SESSION : 2007/2008**

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**RESTRICTED**

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**FREE ACCESS**

Approved by,

(WRITER'S SIGNATURE)

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86400 PARIT RAJA
BATU PAHAT, JOHOR

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APPENDIX A3**UNIVERSITI TUN HUSSEIN ONN MALAYSIA****STATUS CONFIRMATION FOR MASTER'S THESIS****MODELLING OF SWIRLING FLUIDIZED BED HYDRODYNAMIC
CHARACTERISTICS****ACADEMIC SESSION : 2007/2008**

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Approved by,

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86400 PARIT RAJA
BATU PAHAT, JOHOR

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Date: _____

NOTE:

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APPENDIX A4**UNIVERSITI TUN HUSSEIN ONN MALAYSIA****STATUS CONFIRMATION FOR DOCTORAL THESIS****MODELLING OF SWIRLING FLUIDIZED BED HYDRODYNAMIC CHARACTERISTICS****ACADEMIC SESSION : 2007/2008**

I, **SITI NORALIAH BINTI AHMAD**, agree to allow this Doctoral Thesis to be kept at the Library under the following terms:

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2. The library has the right to make copies for educational purposes only.
3. The library is allowed to make copies of this report for educational exchange between higher educational institutions.
4. ** Please Mark (V)

**CONFIDENTIAL**

(Contains information of high security or of great importance to Malaysia as STIPULATED under the OFFICIAL SECRET ACT 1972)

**RESTRICTED**

(Contains restricted information as determined by the Organization/institution where research was conducted)

**FREE ACCESS**

Approved by,

(WRITER'S SIGNATURE)

(SUPERVISOR'S SIGNATURE)

Permanent Address:

NO2, TAMAN WIRA,
86400 PARIT RAJA
BATU PAHAT, JOHOR

Date : _____

Date: _____

NOTE:

** If this Doctoral Thesis classified as CONFIDENTIAL or RESTRICTED, please attach the letter from the relevant authority/organization stating reasons and duration for such classifications.

APPENDIX B

2.5 cm

This thesis has been examined on date
and is sufficient in fulfilling the scope and quality for the purpose of awarding the
Degree of Doctor of Philosophy.

2.5 cm

Chairperson:

4 line

PROF. DR. ABDUL AZIZ BIN DATO' ABDUL SAMAD
Faculty of Civil and Environmental Engineering
Tun Hussein Onn University of Malaysia

4.0 cm

Examiners:

2.5 cm

PROF. DR. MUHAMMAD RASHID BIN RAJUDIN
Faculty of Education
Universiti Teknologi Malaysia

PROF. DR. ZAKARIA BIN KASA
Faculty of Education
Universiti Putra Malaysia

PROF. MADYA DR. MAIZAM BINTI ALIAS
Faculty of Technical Education
Tun Hussein Onn University of Malaysia

2.5 cm

MODELING OF SWIRLING FLUIDIZED BED HYDRODYNAMIC
CHARACTERISTICS

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X

X

MUHAMMAD KAMIL BIN ABDULLAH

A project report submitted in partial
fulfillment of the requirement for the award of the
Degree of Master of.....

Faculty of Mechanical and Manufacturing Engineering
Universiti Tun Hussein Onn Malaysia

APRIL 2006 (*JKPS month*)

MODELING OF SWIRLING FLUIDIZED BED HYDRODYNAMIC
CHARACTERISTICS

4.0 cm

A thesis submitted in
fulfillment of the requirement for the award of the
Degree of Master of.....

Faculty of Mechanical and Manufacturing Engineering
Universiti Tun Hussein Onn Malaysia

APRIL 2006 (JKPS month)

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MODELING OF SWIRLING FLUIDIZED BED HYDRODYNAMIC
CHARACTERISTICS.

MOHAMMAD KAMIL BIN ABDULLAH

4.0 cm

A thesis submitted in
fulfillment of the requirement for the award of the
Doctor of Philosophy.

Faculty of Mechanical and Manufacturing Engineering
Universiti Tun Hussein Onn Malaysia

APRIL 2006 (*JKPS month*)

2.5 cm

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2.5 cm

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8 line

2.5 cm

APPENDIX D1

2.5 cm

2.5 cm

I hereby declare that the work in this project report is my own except for quotations
and summaries which have been duly acknowledged.

4 line

Student :
YUSUF BIN MOHAMMAD ALI

Date :

8 line

Supervisor :
Write name of supervisor here

4 line

Co Supervisor :
Write name of co-supervisor here

2.5 cm

4.0 cm

2.5 cm

APPENDIX D2

2.5 cm

2.5 cm

I hereby declare that the work in this thesis is my own except for quotations and
summaries which have been duly acknowledged

4 line

Student :
SITI SARAH BINTI MUHAMMAD

Date :

8 line

Supervisor :
Write name of supervisor here

4 line

Co Supervisor :
Write name of co-supervisor here

2.5 cm

4.0 cm

2.5 cm

APPENDIX E

For my beloved mother and father

4.0 cm

2.5 cm

2.5 cm

2.5 cm

2.5 cm

APPENDIX F**ACKNOWLEDGEMENT**

The author would like to express his sincere appreciation to his supervisor, Prof. Dr. Mohamad Nor bin Husain for the support given through out the duration for this research.

1.27 cm (0.5 inch)
The cooperation given by the Department of Water Resources Johor is also highly appreciated. Appreciation also goes to everyone involved directly or indirectly towards the compilation of this thesis. Last but not least,.....

ABSTRACT

Spiral catalyst substrate is one of the substrate types for catalytic converter and has high geometric surface area. It is to provide support structure in which the washcoat and the catalyst are applied. Currently, an issue of considerable interest in producing the substrate from a thin sheet metal with a thickness 0.11mm and using FeCrAl material has become a trend. Existing patented apparatus overseas use a complicated system and specific details are scarce. Therefore, this research presents the works in designing and developing an innovative apparatus based on a systematic approach of Pahl and Beitz's model of design process. Furthermore, Finite Element Method (Dynaform) was applied for the forming analysis of a trapezoid cell of corrugation on a thin sheet metal and spiral shape of corrugated sheet metal. These works provide the conceptual designs for the apparatus of Corrugated Tool for corrugation process and Spiral Tool for spiral process. The selected conceptual design was established by developing a model of the apparatus. A rule of thumb for requiring unloaded diameter of corrugated sheet metal in spiral shape was derived. Forming Limit Diagram (FLD) shows that the thin sheet metal was successfully formed without any cracking and Thickness Diagram shows that the thickness of the formed thin sheet metal was in safe thickness. The springback effect that occurs during the sheet metal in spiral shape was solved using the developed casing. The designed apparatus of Corrugated Tool and Spiral Tool were fabricated and optimization was performed by producing the spiral catalyst substrate. The innovative apparatus for producing the full scale of spiral catalyst substrate were successfully designed and developed.

ABSTRACT

The development of the NOSS-based training system and the National Dual Training System (NDTS) as different entities had caused confusion and raised concerns on the future direction and position of the national skills training system in Malaysia. The basic purpose of the study was to examine how they had evolved in order to determine their key characteristics and parameters, and to examine their comparability and ultimately to ascertain whether there was a basis for their integration within the country's national skills training system. The study adopted the interpretive qualitative research design which was premised on the phenomenological approach. For data collection, it employed interviews of key participants in both training systems, review of documents including unpublished official records, case studies and sector study. The development of the training systems were examined utilising analytical dimensions which covered the purpose of training, policy framework, delivery mechanism and work context. The two training systems showed strong convergence in almost all these dimensions. From the investigation, five major themes emerged, namely strong commonalities between the two training systems; fundamental limitations in each of the training systems; well established, existing work-based foundation; the need for a dynamic NOSS-based training system; and the need for re-aligning the NDTS closer to the work context in Malaysia. Based on these themes, the study contended that the NOSS-based training system and the NDTS should no longer be kept separate. Their integration into a unified system can be realized through a framework which meets various key requirements; is conceptually feasible; and involves three main phases of consolidating the existing training systems that include making the NOSS-based training system more dynamic and the NDTS more flexible.

ABSTRAK

Spiral catalyst substrate adalah salah satu daripada jenis-jenis *substrate* yang digunakan untuk *catalytic converter* dan mempunyai luas permukaan geometri yang tinggi. Ianya adalah untuk memberi struktur sokongan dimana *washcoat* dan *catalyst* akan ditempatkan. Pada masa ini, isu-isu yang mendapat perhatian dalam membuat *substrate* daripada kepingan logam nipis dengan ketebalan 0.11mm dan menggunakan bahan FeCrAl telah menjadi kebiasaan. Beberapa alatan sedia ada yang telah dipatenkan di luar negara menggunakan sistem yang berselirat dan perincian tidak diberikan sepenuhnya. Oleh itu, penyelidikan ini mempersempitkan tugas dalam merekabentuk dan membangunkan alatan yang inovatif berdasarkan pendekatan yang sistematik model *Pahl* dan *Beitz's* untuk proses merekabentuk. Tambahan pula, Kaedah Unsur Tidak Terhingga (Dynaform) telah digunakan untuk analisis pembentukan alunan sel berbentuk trapezoid pada kepingan logam nipis dan bentuk lingkaran kepingan logam yang telah dialunkan. Kerja-kerja ini memberikan gambaran untuk konsep rekabentuk untuk alatan *Corrugated Tool* untuk proses alunan dan *Spiral Tool* untuk proses lingkaran. Konsep rekabentuk yang telah dipilih dimulakan dengan membangunkan model alatan tersebut. *Rule of thumb* untuk mendapatkan diameter tanpa beban kepingan logam yang telah dialunkan dalam bentuk lingkaran telah diperolehi. Rajah Pembentukan Tidak Terbatas (FLD) menunjukkan bahawa kepingan logam nipis telah berjaya dibentuk tanpa sebarang koyak dan Rajah Ketebalan menunjukkan bahawa ketebalan kepingan logam yang dibentuk adalah dalam keadaan selamat. Kesan *springback* yang berlaku semasa kepingan logam dalam bentuk lingkaran telah diselesaikan dengan meletakkan *spiral catalyst substrate* dalam bekas yang dibuat. Alatan yang telah direkabentuk iaitu *Corrugated Tool* dan *Spiral Tool* dibangunkan dan kesempurnaan telah dijalankan dengan memhasilkan *spiral catalyst substrate*.

ABSTRAK

Pembangunan sistem latihan berdasarkan Standard Kemahiran Pekerjaan Kebangsaan (SKPK) dan Sistem Latihan Dual Nasional (SLDN) sebagai entiti berlainan telah menimbulkan kekeliruan dan mengakibatkan kesangsian terhadap halatuju dan kedudukan masa depan sistem latihan kemahiran nasional Malaysia. Kajian ini bertujuan untuk menyelidik bagaimana kedua-dua sistem latihan tersebut telah dibangunkan agar ciri dan sifat mereka dikenalpasti, dan seterusnya dibandingkan bagi menentukan keperluan dan asas untuk mengintegrasikan kedua-dua sistem. Kajian menggunakan rekabentuk kualitatif interpretif yang berteraskan kepada pendekatan fenomena. Data diperolehi melalui temubual para peserta penting dalam kedua-dua sistem latihan, kajian dokumen termasuk rekod rasmi, kajian kes dan kajian sektor. Pembangunan sistem latihan diselidik berteraskan dimensi analisis yang meliputi tujuan latihan, kerangka dasar, mekanisme penyampaian dan konteks kerja. Kajian ini mendapati bahawa kedua-dua sistem latihan mempunyai persamaan yang tinggi dalam hampir semua dimensi analisis ini. Daripada kajian, lima tema utama telah dikenalpasti iaitu bahawa kedua-dua sistem mempunyai banyak persamaan; terdapat kelemahan asas dalam setiap sistem; wujudnya sistem latihan berdasarkan pekerjaan yang kukuh; perlunya sistem latihan berdasarkan SKPK yang lebih dinamik; dan perlunya SLDN yang lebih selari dengan konteks kerja di Malaysia. Berasaskan kepada tema-tema ini, dirumuskan bahawa sistem latihan berteraskan SKPK dan juga SLDN tidak wajar wujud secara berasingan. Integrasi sistem dapat direalisasikan melalui suatu kerangka yang memenuhi beberapa keperluan utama; berteraskan konsep yang boleh diterima; serta melibatkan tiga fasa pengukuhan termasuk membentuk sistem latihan berdasarkan SKPK yang lebih dinamik dan SLDN yang lebih fleksibel.

APPENDIX H

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| 5.6 | Pipe System |

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APPENDIX K**LIST OF SYMBOLS AND ABBREVIATIONS**

D, d	-	Diameter
F	-	Force
G	-	Gravity = 9.81 m/s
I	-	Momen of Iner
l	-	Length
m	-	Mass
P	-	Pressure
Q	-	Rate of Flow
r	-	Radius
T	-	Torque
Re	-	Reynold Number
V	-	Velocity
x	-	Shift
Z	-	High
θ	-	Angle
$UTHM$	-	Universiti Tun Hussein Onn Malaysia
$UNESCO$	-	United Nation for Education, Science and Cultural Organization

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APPENDIX M**CHAPTER 2****TITLE CHAPTER**

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APPENDIX N

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**Table 4.3: Comparison between lab and simulation computer result.
(Gist, Schwoerer and Rosen, 1989)**

Length Ratio	Lab Experiment in Average	Comparison Simulation in Average
0.125	0.25	0.137
0.250	0.46	0.560
0.375	0.63	0.738
0.500	0.75	0.861
0.625	0.83	0.939
0.750	0.88	0.981
0.875	0.93	0.997
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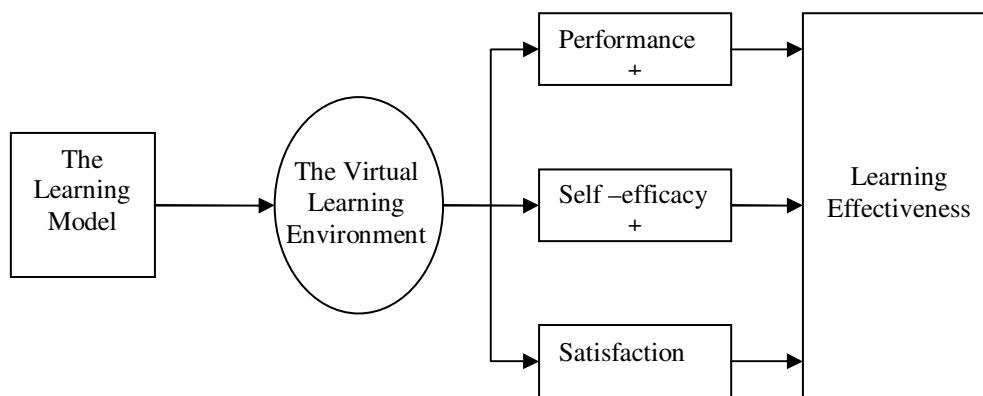


Figure 4.4: Model of the Effectiveness Virtual Learning Environments
(Gist, Schwoerer and Rosen, 1989)

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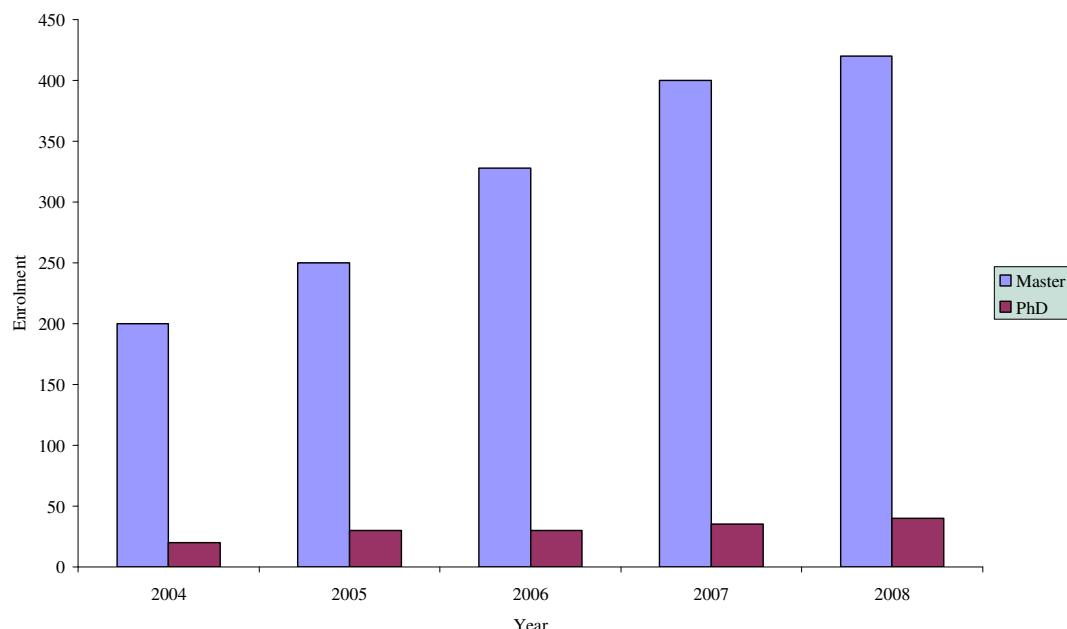


Figure 4.4: Students enrolment from 2004 to 2008 at Pusat XYZ, Kajang, Selangor.

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VITA

The author was born in January 28, 1970, in Malacca, Malaysia. He went to Maktab Rendah Sains MARA, Muar, Johor, Malaysia for his secondary school. He pursued his degree at the University of Sheffield, England, and graduated with the B.Eng. (Hons) in Electronic and Electrical Engineering in 1992. Upon graduation, he worked as a tutor in the Electronics Department at University Kebangsaan Malaysia, Malaysia. He then enrolled at the University of Sheffield, England, in 1994, where he was awarded the M. Eng. in Microwave Communications Engineering in 1996. Thereafter, he taught Electromagnetic Theory as well as Microprocessor Design and Applications at the Electrical, Electronic, and Systems Engineering Department at the Universiti Kebangsaan Malaysia, Malaysia. In 1999, Mr. Abdullah attended the Graduate School of The Pennsylvania State University and was admitted into the Ph.D. program in Electrical Engineering in 2004. During this time, he was a research assistant with the Communications and Space Sciences Laboratory (CSSL), where he had 3 million dollar University Research Initiative sponsored by the Office of Naval Research. He participated in four campaigns in Fairbanks, Alaska, to make low frequency measurements of the high-latitude ionosphere, using the High Power Auroral Simulation (HIPAS) ionospheric heater facility. He was also a teaching assistant with the Electrical Engineering Department of The Pennsylvania State University in 2000. Mr. Abdullah has co-authored three papers in areas of Microprocessor Applications and Theoretical and Experimental aspects of ionospheric heating. He is currently a member of the Institute of Electrical and Electronics Engineering (IEEE). He is also an active amateur radio operator holding callsigns N3FLX and 9M2DX with much interest in satellite, moonbounce, and packet communications.

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APPENDIX R

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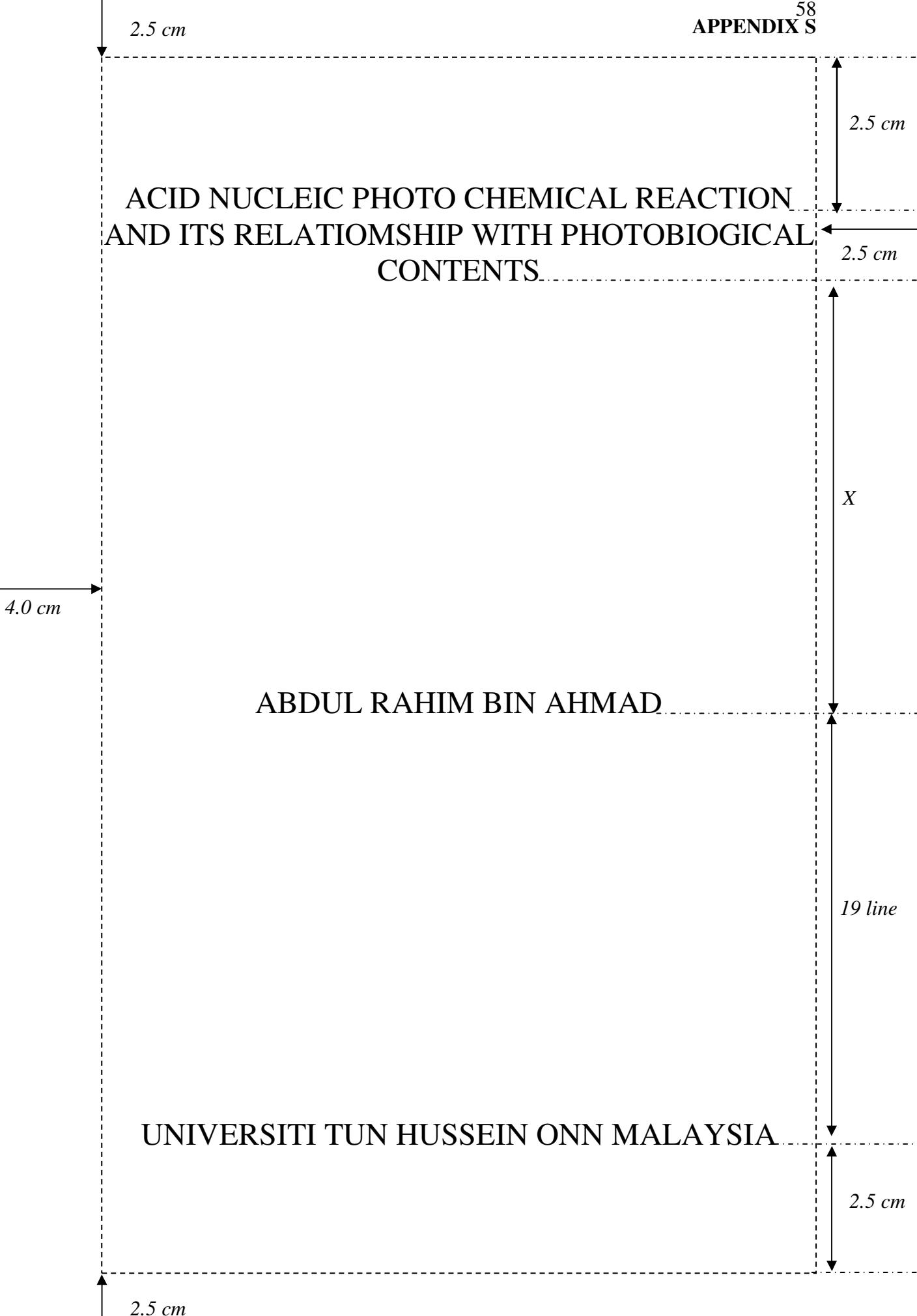
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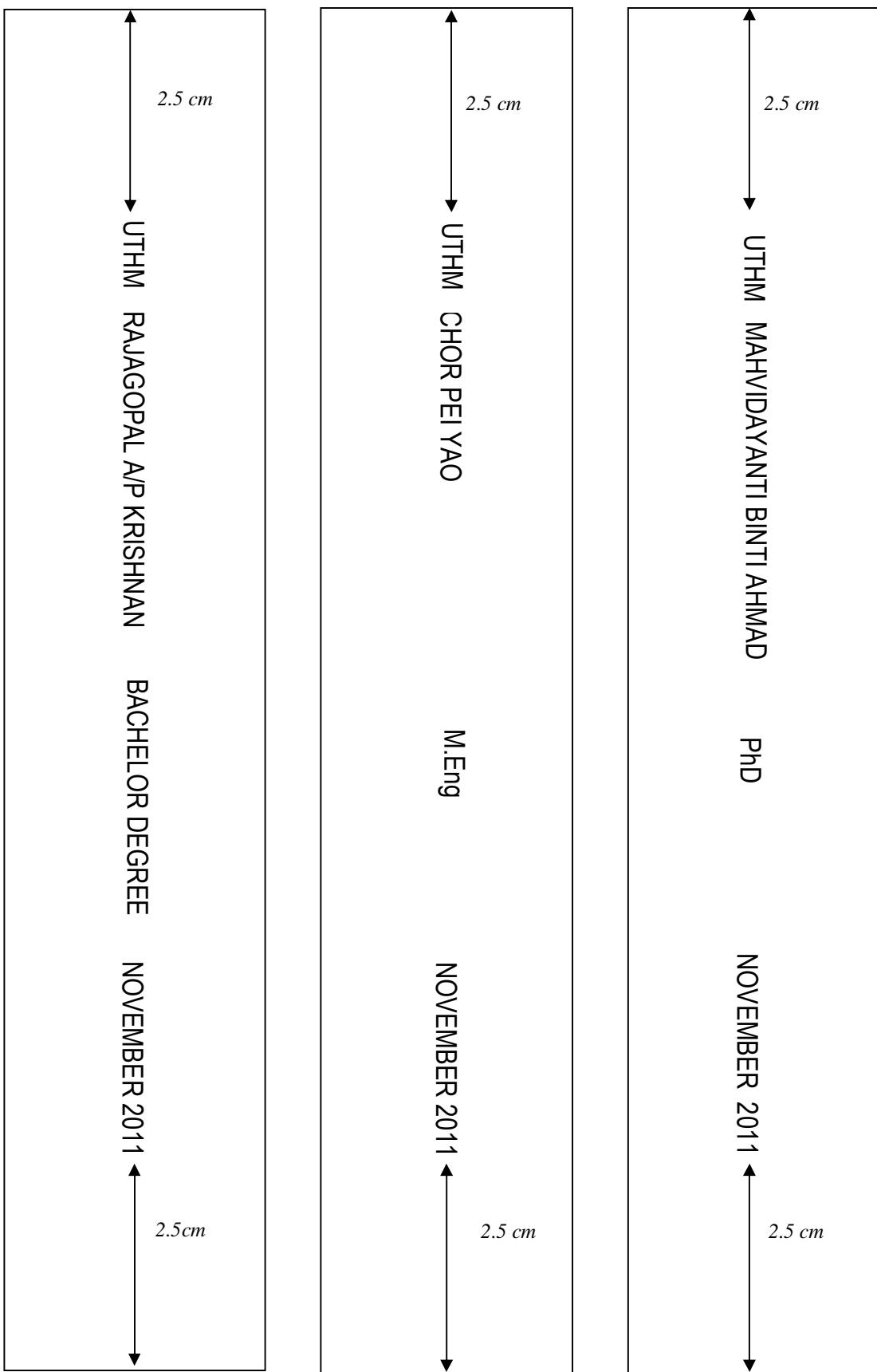
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The writing on the spine for level of study to all Bachelor Degree programmes is BACHELOR DEGREE for English version and SARJANA MUDA for Malay version.

The writing on the spine for level of study to all Doctoral programmes is Ph.D for English version and DOKTOR FALSAFAH for Malay version.

The writing on the spine for level of study for Master programmes as the table below :

FACULTY	PROGRAMMES	PROG. CODE	LEVEL OF STUDY (MALAY)	LEVEL OF STUDY (ENGLISH)
FKAAS	Master of Civil Engineering by coursework	MFA	S.Kej	M.Eng
	Master of Civil Engineering by research	KFA		
FKEE	Master of Electrical Engineering by coursework	MEE	S.Kej	M.Eng
	Master of Electrical Engineering by research	KEE		
FKMP	Master of Mechanical Engineering by coursework	MDM	S.Pend	M.Ed
	Master of Mechanical Engineering by research	KDM		
FPTV	Master of Technical and Vocational Education by coursework	MBV	S.Pend	M.Ed
	Master of Technical and Vocational Education by research	KBV		
	Master of Technical Education (Civil Engineering) by coursework	MBC		
	Master of Technical Education (Electrical Engineering) by coursework	MBE		
	Master of Technical Education (Mechanical Engineering) by coursework	MBM		
	Master of Technical Education (Instructional Design and Technology) by coursework	MBT		
FPTPK	Master of Science in Real Estate and Facilities Management by research	KPF	S.Sn	MSc
	Master of Science in Technology Management by research	KPP		
FSKTM	Master of Information Technology by research	KIT	S.Tek.Mak	M.InfoTech
FSTPI	Master of Science by research	KWZ	S.Sn	MSc

Bloom's Taxonomy Action Verbs

Definitions	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Bloom's Definition	Remember previously learned information.	Demonstrate an understanding of the facts.	Apply knowledge to actual situations.	Break down objects or ideas into simpler parts and find evidence to support generalizations.	Compile component ideas into a new whole or propose alternative solutions.	Make and defend judgments based on internal evidence or external criteria.
Verbs	<ul style="list-style-type: none"> • Arrange • Define • Describe • Duplicate • Identify • Label • List • Match • Memorize • Name • Order • Outline • Recognize • Relate • Recall • Repeat • Reproduce • Select • State 	<ul style="list-style-type: none"> • Classify • Convert • Defend • Describe • Discuss • Distinguish • Estimate • Explain • Express • Extend • Generalized • Give example(s) • Identify • Indicate • Infer • Locate • Paraphrase • Predict • Recognize • Rewrite • Review • Select • Summarize • Translate 	<ul style="list-style-type: none"> • Apply • Change • Choose • Compute • Demonstrate • Discover • Dramatize • Employ • Illustrate • Interpret • Manipulate • Modify • Operate • Practice • Predict • Prepare • Produce • Relate • Schedule • Show • Sketch • Solve • Use • Write 	<ul style="list-style-type: none"> • Analyze • Appraise • Breakdown • Calculate • Categorize • Compare • Contrast • Criticize • Diagram • Differentiate • Discriminate • Distinguish • Examine • Experiment • Identify • Illustrate • Infer • Model • Outline • Point out • Question • Relate • Select • Separate • Subdivide • Test 	<ul style="list-style-type: none"> • Arrange • Assemble • Categorize • Collect • Combine • Comply • Compose • Construct • Create • Design • Develop • Devise • Explain • Formulate • Generate • Plan • Prepare • Rearrange • Reconstruct • Relate • Reorganize • Revise • Rewrite • Set up • Summarize • Synthesize • Tell • Write 	<ul style="list-style-type: none"> • Appraise • Argue • Assess • Attach • Choose • Compare • Conclude • Contrast • Defend • Describe • Discriminate • Estimate • Evaluate • Explain • Judge • Justify • Interpret • Relate • Predict • Rate • Select • Summarize • Support • Value